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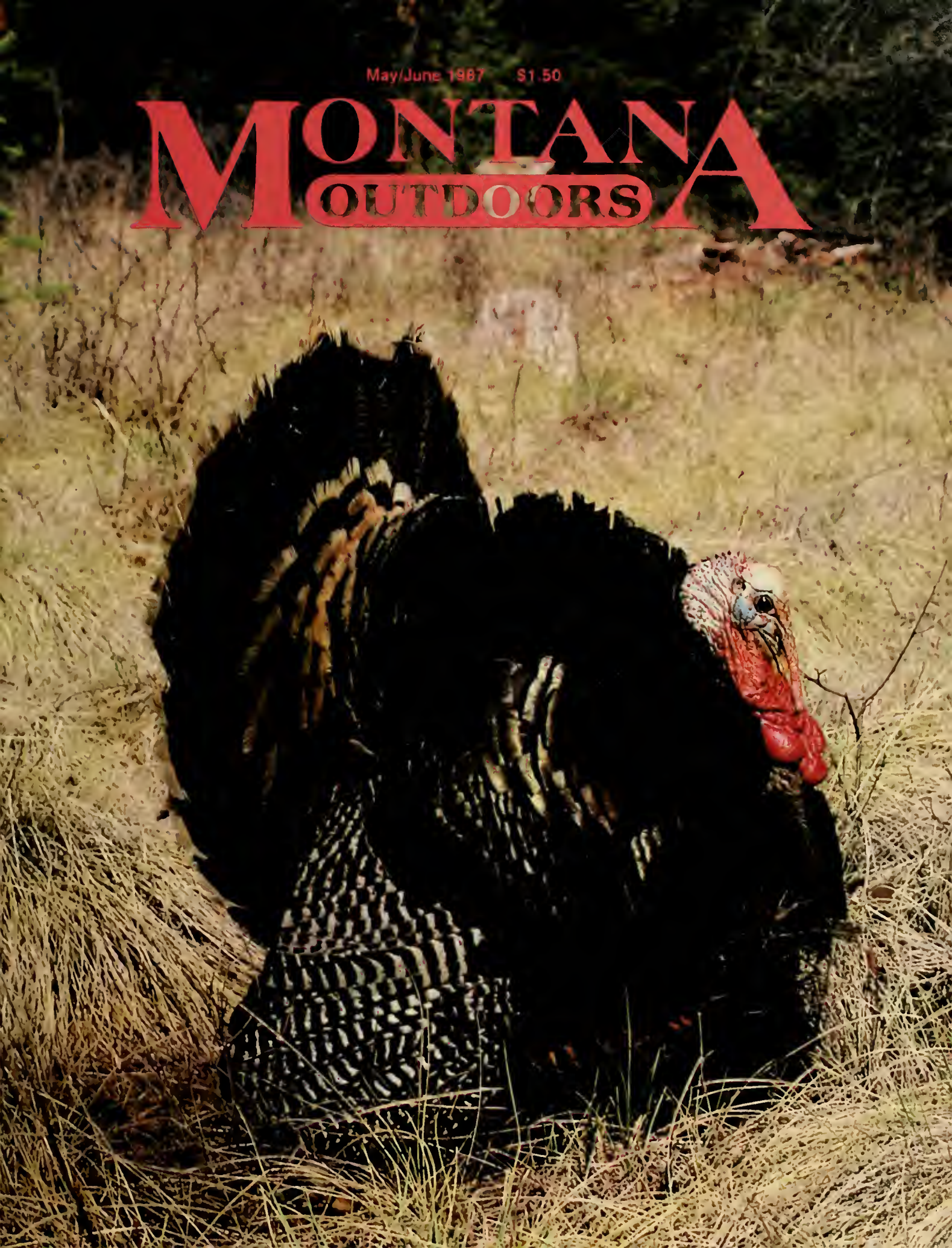
MONTANA OUTDOORS



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see page 2

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MONTANA OUTDOORS

May/June 1987
Volume 18, Number 3

FEATURES

2 Spring Creeks—Precious Secrets
by Janet Decker-Hess, illustrated by Shirley Cleary
Montana's spring creeks are special to many people, for many different reasons.

6 Perspectives—"Are They at Melrose Yet?"
by Jim Belsey, illustrated by Harvey Eckert
Unless you live near salmonfly streams, have a flexible schedule, and reliable informants, it's not easy to "catch the hatch."

8 Black or Grizzly? *by Wayne Kasworm*
Use the 18 pictures of black or grizzly bears to test and improve your identification skills.

15 DU—Launching Waterfowl's Lifeboat *by Tom Palmer*
In three years, Ducks Unlimited has spent $2 million on wetland development in Montana.

21 What's Bugging That Fish? *by Jim Peterson*
Call the Fish Health Lab for the answer—the lab welcomes calls from concerned fishermen.

24 The One-That-Didn't-Get-Away Club—1986
Montana's 1986 record-setting fish.

27 How the Cutthroats Reached Montana *by Jim Roscoe*
What trout are really native to Montana, and how did they get here?

32 Dancing Across the Waves *by Bill Stroud and Jerry Walker*
The popularity of sailboarding—the "newest" of water sports—is soaring in Montana.

34 A Fish Called Cisco *by Bill Wiedenheft*
No kidding—the cisco is the long awaited new forage fish in Fort Peck Reservoir.

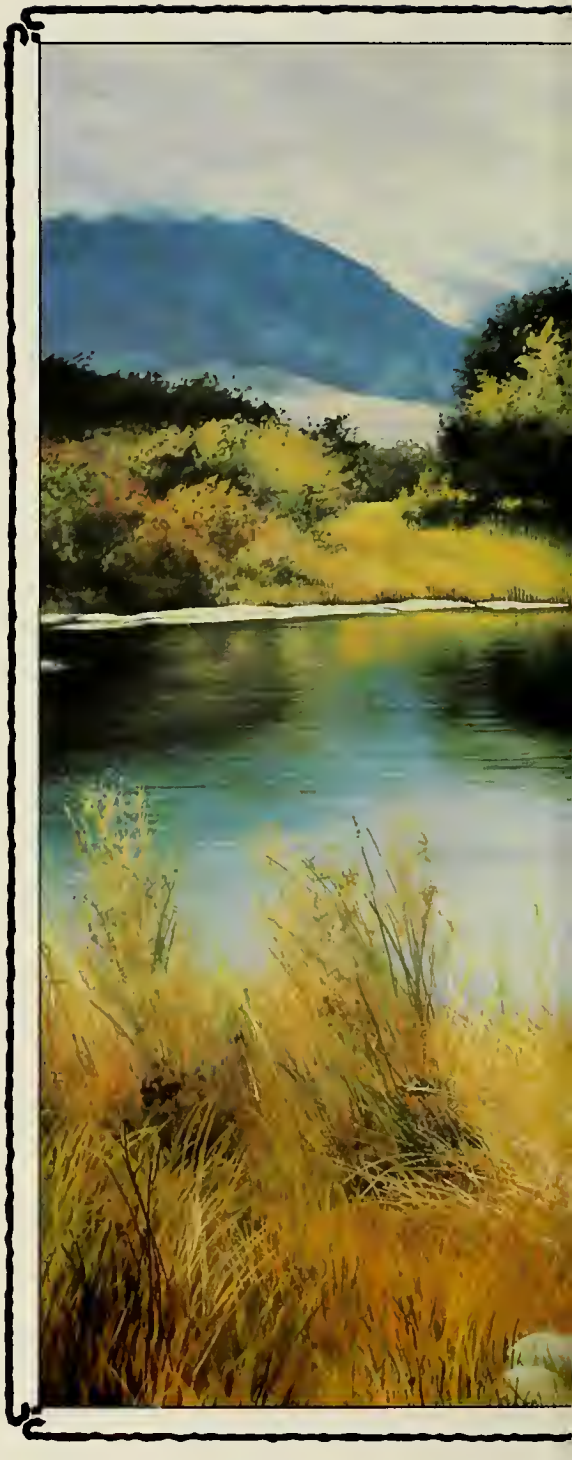
DEPARTMENTS

11 The Catchall
14 Nongame News
23 Readers Respond
26 Book Reviews
31 Contributors

COVERS

Calling a wild turkey in the spring often results in "no answer." There's no such thing as a "sure bird," and pursuing a gobbler is challenging, frustrating, and habit-forming (front cover photo: Dave Books). On Lake Elmo near Billings and on other bodies of water all across the country, brightly colored sails dance across the water (inside front cover photo: Ray Berntsen). Of the physical characteristics used to distinguish between black and grizzly bears, coat color is the *least* reliable. Not all black bears (back cover photo: Mike Logan) are black, and not all grizzly bears are "grizzled."

SPRING



Anglers worship them, outdoor writers exalt them, and scientists treasure them. Montana's spring creeks are precious secrets, their locations passed down from generation to generation. Angler Tom Wenelbalt confides that spring creek trout are "heavier than any stream trout of the same length I have ever landed"; author Charles Waterman remarks that "many fly fishermen have given up financial success to live by such streams"; and ecologist H.T. Odum notes spring creeks provide "refuges for aquatic organisms during geologic periods when climatic changes have occurred."

The three are alike in their praise of the value and uniqueness of spring creeks, these upwelling underground streams, enriched from subsurface journeys, sources of constant clear, cool waters, providing ideal trout homes from birth through adulthood. They are short streams, emerging at the base of mountain foothills or limestone outcrops, silently traveling through Montana valleys of willow and alder, alfalfa and bluebunch wheatgrass, white-tailed deer and beaver.

"Untouched, pristine waters" is the image that comes to mind when the magical words "spring creek" pass from one ardent angler's lips to another's waiting ears. A reality? Is all still well in Camelot, or has Merlin's magic spell worn off? An investigation of Montana's spring creeks begun in 1985 set out to answer that question.

The spring creek inventory was funded by the American Fisheries Society, a professional organization of fisheries biologists and fish culturists, in cooperation with the Montana Department of Fish, Wildlife and Parks (DFWP). The major objectives were to inventory Montana's spring creek resource, determine their status through site investigation, and compile all existing biological, physical, and chemical data. From the inventory, fisheries biologists determined habitat trends and limiting factors and suggested management strategies.

Despite the uniqueness and popularity of spring creeks to the angling public, no major survey previously had been conducted in Montana. An informal questionnaire circulated among DFWP fisheries biologists in 1979 listed only 30 major spring creeks in the state. The limited information available had been restricted to spawner use of spring creeks by mainstem river fish rather than substantial information about the spring creeks themselves. Information had, however, been collected on spring creeks in the Madison and East Gallatin River drainages for use in instream flow justification. Even the material collected on spring creeks involved with state, federal, or private hatchery systems had been limited to physical and chemical data.

This lack of biological information on most of our spring creeks results from the basic nature of the resource. They originate primarily in valley bottoms, generally private land with restricted public access. In addition, because of their shortness and elusive nature as they meander through tall meadow grasses, many have gone unrecognized by anglers.

If they are so elusive, how did we find them? Initially, we used information from DFWP fisheries sources and a geothermal site inventory conducted by the Montana Bureau of Mines. We also contacted state and federal fisheries managers and biologists and private conservation and consulting groups. How did we define "spring creeks" for the inventory? The creek's flow had to exceed five cubic feet per second (cfs), unless local or regional importance warranted inclusion of a smaller creek. Water from springs had to contribute at least 50% of the stream's flow.

The results? We inventoried 68 major spring creeks in nine drainages in Montana. Their locations ranged from the cedar forests of the Kootenai in the northwestern part of the state to the grasslands of the lower Yellowstone in the southeastern corner. Their origins varied from the trickling of subsurface flow into a channel paralleling a major river to a single source bubbling up from a hole in the earth's crust. A spring creek could be the only one for miles around, or it could be one of a series created by the melting snowpack of a mountain range. Their lengths ranged from a few hundred feet in the case of Giant Springs on the banks of the Missouri River to a 30-mile journey by the renowned Big Spring Creek near Lewistown. Flows from a spring in central

Creeks—Precious Secrets

by Janet Decker-Hess
illustrated by Shirley Cleary

Montana have been measured in excess of 200 cfs—similar to the Big Hole River's flow on an August day. Their flows begin in municipalities, fields of bluebunch wheatgrass, and at the sites of turbines once used for electrical generation to mill gold. Over 70% of the state's spring creeks are in southwestern Montana, contributing to the mighty Madison, Gallatin, Beaverhead, and Yellowstone. We inventoried only one small spring creek in the Big Hole drainage.

All but four of the 68 are found on private property. Three of these four were above the valley floor on Forest Service land. An atypical spring creek, Black Sand Creek in the Beaverhead National Forest, is volcanic in origin, flowing over black gravels and very low in productivity. These are Montana's spring creeks—no two the same.

Their uses are as varied as their habits. The most predictable use is, of course, angling. Poindexter Slough, the only spring creek purchased for public use by license dollars, has received 1,600 angler days per year in recent years. Fly fishermen from

JANET DECKER-HESS

every state in the nation spend spring days casting tiny dry flies on gossamer tippets into Poindexter's waters while Montana's major rivers are muddied by runoff. Bird watching and wildlife photography also play a major role in the life at Poindexter Slough. Great blue herons skillfully stalk their prey, muskrats hide in undercut banks, and a variety of nongame birds inhabit streamside willows, alder, and dogwood. Other larger spring creeks, privately owned, have established fee schedules with a daily maximum rod limit. Currently, anglers are charged a fee to wet their lines at three spring creeks. Angling enthusiasts enjoy still others through landowner permission. Even the smaller, less obvious, creeks are appreciated by anglers, as they laze away summer afternoons with a hook and a worm, catching their limit of brook trout.

State, federal, and private hatcheries have set up shop on Montana's spring creeks because the moderate temperatures and constant flows are ideal for egg, fry, and adult trout rearing. State hatcheries on Big Spring Creek, Giant Springs, and Bluewater Spring Creek provide water for rainbow trout production. U.S. Fish and Wildlife Service hatcheries on Blaine Spring Creek and the Creston Hatchery on Mill Creek produce brood and experimental stocks for other hatcheries.

Commercial trout producers have also developed Montana's spring creeks. "Fish farms" have been established on many of the larger springs, most notably the now bankrupt Jumping Rainbow Ranch Corporation. In the late 1970s and early '80s, Jumping Rainbow had contracted with landowners on six spring creeks to produce rainbow trout. Currently, only two creeks in the state produce commercial rainbow trout. Unfortunately, commercial fish production has damaged spring creeks. Pond construction has altered channels, diversions have caused dewatering, and changes in wild trout population dynamics have resulted from escaped hatchery stock.

From studies conducted in the upper Yellowstone and mid-Missouri drainages, several spring creeks have been named as critical spawning areas for river populations of brown, rainbow, and cutthroat trout. Flathead Lake kokanee spawners use the channel or mouth of all 10 springs inventoried in the upper Flathead River drainage. Biologists are investigating still others for their potential as spawning channels to supplement natural stocks.

The uses of spring creeks continue, although Camelot is now looking a bit tattered and worn. Those constant flows, moderate temperatures providing open water year-round, and channels conveniently cutting through hayfields, make a

Unfortunately, many spring creeks have been abused by livestock or dewatered for irrigation. Agricultural use does not have to be forsaken, but innovative stock watering systems and irrigation alternatives need to be devised.

Montana rancher feel "blessed" that he has a spring creek on his property—the envy of his neighbors. Those secret shrines of the fly-fishing public also serve as the ideal livestock watering hole or the perfect irrigation channel. As a result, there have been impacts. Sloughing banks, caused by livestock trampling and resulting in widened streams now only inches deep, were observed. A "riparian zone" consisted of one dead willow. Channels dewatered during the growing season and gravels covered by fine sediment over a foot thick were not uncommon. This occurred on spring creeks that are still recognizable; others have lost their identity forever. Perhaps Charles Waterman says it best: "...dammed, destroyed, or otherwise diverted from their destinies as proving waters for angling's elite."

The future? Because of support from the American Fisheries Society and others, we have up-to-date information about Montana's spring creeks. Yes, our spring creeks are special, but special to many people, for many reasons. The delusions of "pristine and untouched" have been put to rest. Many spring creeks—their vegetation gone, abused by livestock, channelized for irrigation—are now too shallow to support good trout populations. To date, only one spring creek has been acquired for the public's enjoyment.

Are there tricks left in Merlin's bag to restore this fading resource? The magic still exists, as long as the illusion no longer sidetracks our attention. The trick is getting all of those interested to join forces.

Agricultural use does not have to be forsaken, but innovative stock watering systems and irrigation alternatives need to be devised. Spring creeks not only provide a unique environment but also a forgiving one. Because of their productive nature and consistent flows, they heal easily.

BRUCE ROBERTS

Most of Montana's spring creeks are found on private property. Nelson's Spring Creek, pictured here, is a well known mecca for fly fishermen from all over the country.

BRUCE ROBERTS

As with any problem that involves numerous players, a task force with representatives from the private and public sector is another possibility. We also need to rank spring creeks according to their local, regional, or drainage importance. Criteria could include potential and/or existing fisheries populations, current condition and rehabilitation costs, mainstem river populations and reproduction needs, mainstem water quality and quantity, and available public angling.

The highest priority creeks should be considered for public acquisition. In 1979, the DFWP purchased the lower two miles of Poindexter Slough. The purchase was made possible with the assistance of The Nature Conservancy and funding from the federal Land and Water Conservation Fund. However, no additional spring creeks have been acquired since. Acquisition is the only way to ensure public access as well as enduring protection to Montana's spring creeks. Acquisition of a reach of a spring creek is not enough, unless conservation easements or some other form of protection prevents abuse in the headwaters. Ideally, purchases must include the entire spring creek.

Local sportsman's groups, conservation organizations, and professional wildlife and fisheries societies could begin an "Adopt-A-Spring Creek" program. Members working with a DFWP biologist could contact spring creek landowners to determine the potential for land acquisition, conservation easements, and rehabilitation.

Cooperation between private landowners and conservation organizations has already led to successful rehabilitation on several spring creeks. A spring creek in the Jefferson drainage was fenced through a cooperative effort between the landowner and the Butte Chapter of Trout Unlimited. Money for the project was acquired by the Montana Department of Natural Resources Renewable Resources Grant Program, with labor from the chapter members. The fencing resulted in healthier banks, increased depth, and reduced sedimentation. With additional work, this spring creek could provide essential spawning habitat for the now limited Jefferson River rainbow trout population. With the help of the Madison-Gallatin Chapter of Trout Unlimited, a small reach of Darlington Ditch in the Madison drainage was reconstructed. A straight, shallow channel with little available instream cover was transformed into a meandering stream with deep pools and undercut banks.

Spring creek owners have also taken on a new look. In recent years, private citizens have purchased a number of Montana's spring creeks in an effort to restore these unique environments. In all instances, some level of restoration has occurred. On two spring creeks, one in the Yellowstone and the other in the Bitterroot, new owners have relocated channels, dredged sediments, placed artificial habitat structures, and planted streamside shrubs. In one channel, where livestock grazing was discontinued, watercress began to grow along the stream's edge, shrinking the channel and trapping sediment in the aquatic growth. Eventually, successional processes will create soil suitable for re-establishment of woody species. The Flathead Conservation District is now working with residents living along a spring creek east of Kalispell in an effort to rehabilitate the channel for use by Flathead Lake kokanee spawners.

Poor land use practices may not be the only factor limiting fish reproduction in spring creeks. Anglers may also have a negative impact—not from catching spawning trout, but from wading in stream channels. A request by concerned landowners led to a study of the effect of anglers trampling on trout embryos incubating in stream gravels. The project was funded by the DFWP, with research conducted by Montana State University Fisheries Cooperative Unit graduate students.

The study design included controlled wading on incubating eggs in artificial channels during all reproductive stages from egg to emerging fry. Findings indicated embryo survival was reduced as a result of compaction from wading. The lowest survival, less than 10%, resulted from disturbance twice a day during the entire incubation period. Although data collected in spawning areas within the creek showed wading-related mortality could potentially have an impact on river cutthroat that spawn in the spring creek, angler harvest in the river was still considered to have a far greater impact.

We can all share in the blame for the present condition of Montana's spring creeks. A resource revered by ecologist and angler alike, providing homes for ecological communities found nowhere else in the world, deserves a higher priority than we are giving it. In a state so blessed with abundant populations of fish and wildlife, it is sometimes easy to forget small streams flowing through hayfields. It is now up to us to bring back a resource too precious to lose.■

"Are They at Melrose Yet?"

by Jim Belsey
illustrated by Harvey Eckert

If it's true that "there's nothing a vulture hates more than biting into a glass eye," then it's equally probable that there's nothing a trout loves more than biting into a large, succulent stonefly. Happily for the trout, on many Montana rivers the opportunity to do so is an annual banquet, commonly called the salmonfly hatch. If the blessed event is a bonanza for the fish, it is a piscatorial dream—though sometimes a sociological nightmare—for the angler.

The adult salmonfly (known as *Pteronarcys californica* to Latin scholars, bilingual biologists, and show-off fishermen) more or less appears to be a handsome, winged, orange-tinted, aquatic version of a cockroach. Presumably, trout lust after them not so much because they taste like chocolate chip cookies, but due to availability. These critters spend three years as nymphs crawling around rocky river bottoms avoiding trout jaws, then hike en masse over to the stream bank and shed the straitjacket they've been stuck with underwater. All a trout has to do is park under a willow bush and wait for the hatched-out salmonflies to fall back into the river before they fly off to do friendly things with other bugs of the opposite persuasion.

Another reason that trout view a salmonfly the way a coyote looks at a lamb chop is its size—up to three inches long and built along the lines of an NFL safety. It would take somewhere around the cube root of a googol of those little mayflies that hover over the Missouri to deliver a nutritional wallop equal to a couple of salmonflies. Anglers have reported finding as many as 60 of the big bugs in one trout stomach. It is said that some fish get as much as one-third of their annual grub intake during the hatch. And it seems the more of these big stoneflies a trout inhales, the more rapacious he becomes. The most vicious assault on a dry fly these eyeballs have witnessed came from a 17-inch brown trout whose bulbous stomach sagged like a hammock stuffed with sumo wrestlers.

The scholarly, scientific data revealed above helps explain why certain fly fishers drain their brains and wallets trying to "catch the hatch." Unless you live near salmonfly streams, have a flexible schedule, and reliable informants, it's not easy. Despite the fact that many Montana rivers supposedly have hatches "on schedule," these big aquatic hamburgers don't seem to know what river they're in, let alone what day of the month it is. No one knows exactly what triggers their move to the beach—probably a combination of water temperature, turbidity, stream flow, a too-tight straitjacket, and other factors—but the calendar it's not. One out-of-state pursuer figures he catches the hatch in about one of seven tries.

As unpredictable as the emergence of adult salmonflies can be, a trout's willingness to take them is even more so. A highly respected fisheries biologist has pointed out that trout aren't exactly super quick-witted; for example, it sometimes seems to take them a day or two to recognize the adult salmonflies as food. Other times, they'll start hitting them immediately.

Salmonfly hatches begin low on a river and move upstream, again at varying, unpredictable rates. Curiously, sometimes they won't appear at all on a stretch of a few miles, then suddenly emerge in hordes above it.

Obviously, the trick for anglers seeking to catch trout on dry salmonfly imitations is to be on the part of the river where trout are dining on the surface. Many fishermen assume this will be when the bugs first start hatching out, so they spend a lot of time racing from boat put-in to saloon to take-out, asking questions like, "Are they at Melrose yet?" "Have they showed up at McAtee?" "Seen any at Mallard's Rest?" Then it's a car shuttle that would earn a checkered flag at Indianapolis and into the boat. If the 'flies in fact are there, they may not be in the water, and if they are, the trout may be treating them like so many twigs. A man can spend days at a time casting Sofa Pillows or Fluttering Stones or even the infamous Bottle Brush under willows laden with the real thing and never get a take.

But wait! There is still the opportunity for action, since you know that big trout have been hanging around the banks gobbling up stonefly nymphs on their march to dry land. So clip off your effete, delicate No. 2 dry fly and get going with a couple of big, ugly, lead-weighted No. 2 Rubber Legs (it's important to cast doubles to give yourself a better chance to hang up and lose them two at a time). Remember, this is serious business. You can always claim later you were using drys.

Anyway, as mysterious as the whole fool, wonderful thing is, give it a shot. You'll hardly notice the flotilla of boats or the salmonflies crawling down your neck. The chances of a head-on collision on the river are minimal. It's hard to lose more than 20 or 30 or 50 flies a day. If you run out of eight-pound tippet material, you can tie on 10-pound, or 12, or 20. Who cares? And the reward may just be a whole bunch of attacks on your dry fly that are only a bit less vicious than a Lawrence Taylor tackle. Enjoy.

But don't forget Damon Runyon's admonition, "Life is 6-5 against." For salmonflies, make that 6-1.■

An annual banquet called the salmonfly hatch is a bonanza for the fish, but sometimes a sociological nightmare for the angler.

If you're a bear hunter, the future of your sport may depend on knowing the right answer.

BLACK OR GRIZZLY?

1.

by Wayne Kasworm

The popularity of black bear hunting in Montana has increased dramatically in the past 15 years. From 1971 to 1985, hunter numbers increased more than 250%. On the basis of hunter recreation days, black bear hunting ranked third in popularity behind deer and elk in 1985.

Black bears are distributed over about 34,000 square miles in Montana, or 23% of the state. Almost half of this area is also occupied by grizzly bears. Because grizzly bear hunting is much more closely restricted than black bear hunting, it is imperative that hunters positively identify their target before shooting.

The grizzly was listed as a threatened species in 1975 throughout its range in the lower 48 states. In response, the Montana Department of Fish, Wildlife and Parks (DFWP) negotiated with the U.S. Fish and Wildlife Service to establish an annual quota of 25 man-caused grizzly bear mortalities (from hunting, control actions, accidents, etc.) in northwestern Montana. In 1983, this quota was further restricted by limiting the annual man-caused mortality of female grizzlies to nine.

Between 1975 and 1985, the DFWP documented 11 grizzly bears killed because of mistaken identity. Unreported mortality of grizzly bears, some of which may be due to mistaken identity, is estimated at seven bears annually in northwestern Montana. Mistaken-identity kills of any animal are detrimental to the future of ethical sport hunting. Such mistakes seriously threaten the limited grizzly bear season in Montana, as well as the spring black bear season.

In 1984, the DFWP began presenting a slide series on bear identification to interested sportsmen, school groups, and civic organizations in northwestern Montana. Audiences were asked to place themselves in the position of a black bear hunter in northwestern Montana with the grizzly season closed. Each person was given an answer sheet, and slides were flashed on the screen for 10-15 seconds. People were asked: (1) whether the picture of the animal or sign was that of a black or grizzly bear, and (2) whether they felt sure enough of their identification of the animal as a black bear to shoot it. At the end of the series, the slides were shown again and the characteristics which made identification possible were discussed.

Eighteen pictures of bears or bear sign follow; they can be

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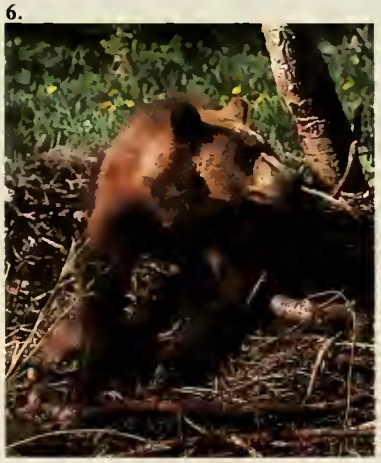

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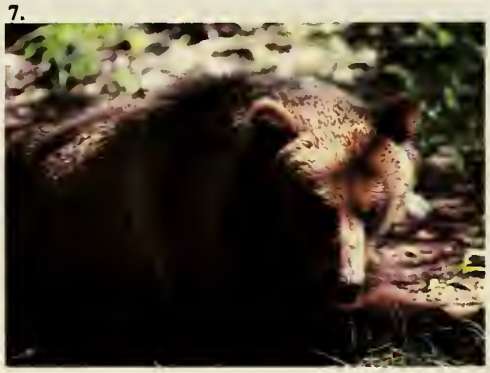

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photo credits: 1, 2, 3, 6, 7, 8, 11, 12, 16, Wayne Kasworm; 9, 10, 14, 17, Richard D. Mace; 13, 18, Tim Manley; 5, 15, Keith Aune; 4, Mike Madel.

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used to test and improve your ability to identify black and grizzly bears. Remember that you are a black bear hunter in an area closed to grizzly hunting. Use a piece of paper with a number for each picture and answer these two questions: (1) Is it a black or grizzly bear? (2) Are you sure enough that it's a black bear to shoot it? When you've completed the quiz, turn to page 10 for the correct answers and a summary of identifying characteristics for each photo.

Black and grizzly bear identification is based on several physical characteristics. Despite the names "black" and "grizzly," coat color is the *least* reliable characteristic, since not all black bears are black and not all grizzly bears are "grizzled." Black bears can be blond, cinnamon, dark brown, or black; grizzly bears can be light-colored, many shades of brown, and occasionally even black. Not all grizzly bears have the silver-tipped guard hairs that give the animal a frosted or grizzled appearance, and hence the name "grizzly."

Like color, size is variable and not a good identifying characteristic. Most people overestimate the size of grizzlies. In Montana, typical adult female grizzly bears weigh 200-350 pounds and typical adult males weigh 300-550 pounds. An adult male black bear can easily weigh as much as or more than a female grizzly.

Grizzly bears have well-developed muscles in the shoulders, and often appear to have a shoulder hump; black bears lack a prominent shoulder hump.

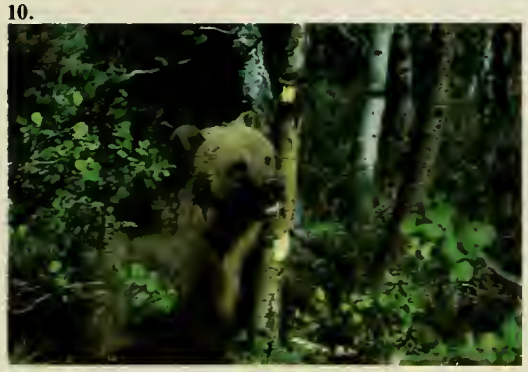
Grizzlies have long, gently curved claws adapted for digging. Black bears have shorter, more sharply curved claws, which are better adapted for climbing trees and tearing logs apart.

The grizzly bear has a concave or "dish-shaped" face in profile, while the profile of the black bear is fairly straight from forehead to nose. The concave shape of the grizzly bear's profile makes the face appear broader than that of the black bear.

Ear position and shape is one of the better identifying characteristics. The black bear's ears tend to be larger, more erect, and more pointed than those of the grizzly, whose ears tend to be smaller and more rounded.

It is important to remember that all of the above characteristics can vary with sex and age of the individual. Proper field identification should involve careful scrutiny of several characteristics. Responsible hunters always make sure of their target; they don't shoot when the light is poor or when a brief glimpse of a fleeing animal makes identification difficult.

Above all, if you're not sure, *don't shoot.* ■



10.

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14.

15.

Estimating Black Bear Weight

When someone asks, "How big was that muley buck you shot last fall?" you will probably reply, "It was a four-point," or "a fork-horn." Similarly, when we talk about bull elk, we usually refer to "spikes," "raghorns," "five-points," or "six-points." But what do you say when someone asks you, "How big was the black bear you shot?"

Official trophy scores, such as Boone and Crockett, are based on skull measurements (the length plus the width). A score of 19 is respectable in Montana, but only one Montana black bear is listed in the 1981 Boone and Crockett record book. The Boone and Crockett minimum score is 21. But most of us don't think in terms of Boone and Crockett scores, especially for black bears. We are more likely to think in terms of weight.

You could pack a spring scale, but there is an easier way to estimate the weight of your bear, with just the help of a tape measure (farmers and stockmen have used tapes to estimate the weight of cattle and hogs by measuring chest girth for some time). Weight and girth measurements taken from tranquilized black bears during research have allowed us to develop this equation for estimating the weight of Montana black bears:

(chest girth in inches)^2 X .148 - 5.2 = weight in pounds

For example: chest girth = 38.5 inches

$(38.5)^2$ X .148 = 219.4

219.4 - 5.2 = 214.2 pounds

For bears greater than 75 pounds, predicted weights should be within 10% to 15% of true weight. This equation won't work well on measurements obtained from hides, because hides are stretched and will yield inaccurate results.

16.

17.

18.

The following key identifies the bear pictures. The correct species is listed first, followed by a summary of the characteristics in the photo useful in making proper identification.

1. **Black bear.** Ears are larger and more pointed than those of a grizzly; long claws are not evident on the forelegs; there is no shoulder hump. The color is not a reliable indicator, because grizzly bears can be black, too.

2. **Grizzly bear.** Ears are smaller and more rounded than those of a black bear; face is broad; claws on forelegs are long. The coat appears grizzled because of silver-tipped guard hairs.

3. **Black bear.** Ears are larger and more pointed; long claws are not evident on the forelegs; face is narrow.

4. **Black bear.** Ears are larger and more pointed; face is narrow; there is no shoulder hump. This is an unusually blond-colored black bear.

5. **Grizzly bear.** Ears are shorter and more rounded; face is broad; coat is grizzled; claws on forelegs are long.

6. **Grizzly bear.** This is a tough one; many features look like a black bear, but this is a yearling grizzly. Note the long claws on the forelegs. Young grizzlies occasionally don't display typical adult characteristics.

7. **Grizzly bear.** Claws on forelegs are long; coat is grizzled; there is a shoulder hump; ears are shorter and more rounded.

8. **Black bear.** There is no shoulder hump; face is not dish-shaped in profile.

9. **Grizzly bear.** Face is broad; ears are shorter and more rounded.

10. **Grizzly bear.** Ears are smaller and more rounded; face is broad; coat is grizzled.

11. **Grizzly bear.** Face is broad; ears are smaller and more rounded; coat is somewhat grizzled.

12. **Black bear.** Ears are larger and more pointed; there is no shoulder hump.

13. **Black bear.** Long claws are not evident on the forelegs; ears are larger and more pointed. This bear appears to have a shoulder hump because of the body and head position.

14. **Grizzly bear.** Face is broad; there is a shoulder hump; ears are smaller and more rounded; coat is grizzled.

15. **Black bear.** There is no shoulder hump; ears are larger and more pointed.

16. **Grizzly bear track.** Claw length is a good characteristic for identifying tracks. Distance between the claw marks and the leading edge of the toe pads should exceed 1-3/4 inches for grizzly bears. These long claws occur only on the forelegs. A grizzly bear's toes usually form a relatively straight line across the front paw. A black bear's toes usually form a more curved line across the front paw (see photo 17).

17. **Black bear track.** Distance between claw marks and the leading edge of the toe pads seldom exceeds 1-1/4 inches for black bears. The line of toes is quite curved across the front of the paw.

18. **Grizzly bear track.** Note long claw marks in the snow ahead of the toe pads.

Hegstad Leaves; Howell Arrives

When Spencer Hegstad resigned his post as chairman of the Montana Fish and Game Commission to take a similar post with the new Montana Lottery Commission, it was natural for him to add up both sides of the ledger.

Hegstad resigned in January after 11 years on the Montana Fish and Game Commission. He was appointed commission chairman in 1979 by Gov. Tom Judge.

Through the years, Hegstad demonstrated strong and determined leadership as chairman. His concerns for the lands and waters of Montana are reflected in the manner in which the resources are managed today. He championed land acquisitions for wildlife and adequate flows of quality water for fish. And in an era marked by confrontations among diverse special interests competing for use of a limited resource, Hegstad's lasting hallmark will be the spirit of cooperation he instilled on the commission and within the Montana Department of Fish, Wildlife and Parks (DFWP).

"If you look at the state in 1976 when I came on the commission and looked at our charge to protect and enhance the wildlife resource, I can feel good about the things we've accomplished," Hegstad said. "You can look around and see that we have the last of what's best in the lower 48 states."

Hegstad was the last of the commission chairmen who also served as head of the Department of Fish, Wildlife and Parks. The 1979 Legislature changed the law and made the governor-appointed director the agency's chief. "It hurt at the time, because it was taking some power away from me," Hegstad recalled, "but I can see why that's the way it should be."

At a banquet in his honor in Helena, Hegstad noted his tenure as commissioner was both "a pleasure and a privilege. All of us on the commission appreciate the support the department has offered us."

The way Hegstad sees fish and wildlife resource issues of the future, a significant change is upon us. The fish and wildlife decisions of the past, Hegstad said, were almost exclusively based on biological information. More and more, he said, the decisions are now tied to "landowner-sportsmen" relations.

"In Montana, we feel it's a God-given right to hunt when we want and where we want. But because there is more pressure being placed on the resource, I think that is going to change," Hegstad said. "It all comes down to the word 'quality,' and in a lot of ways that quality can only come with

TOM WARREN

Spencer Hegstad

better relations between the landowners and the sportsmen.

"You do some good things and make some advancements and think you are doing the right thing but I don't know if we ever get any closer together. That has been the most frustrating thing about the job. This is a big state and the only way to do it right is to get the landowners and the sportsmen together.

"In the future," Hegstad concluded, "we'll be regulating people, not the resource."

* * * * *

F.W. "Bill" Howell, recently appointed to the Montana Fish and Game Commission by Gov. Ted Schwinden, is no stranger to the DFWP.

For six years, beginning in 1969, Howell was a consultant to the department. One of his most memorable achievements was helping produce, edit, and focus the DFWP's first comprehensive documention of wildlife management in Montana.

The book Howell edited with Thomas W. Mussehl was "Game Management in Montana." Published in 1971, it marked the first major conservation publication produced by the department. The lively 30-year history of Montana's game management efforts proved to be both popular and educational.

Howell, 47, spent the mid-60s in the Agricultural Extension Program at Montana State University in Bozeman. He later served as the national managing editor of the *4-H News* in Chicago before returning to Montana.

In his DFWP consulting work, Howell directed segments of several department publications, including reports on antelope, upland game birds, and the effect of pesticides on elk reproduction. The now classic history of the Sun River elk herd, "Saga of the Sun," was among the publications Howell helped to produce.

An avid sportsman, Howell originally came to Montana from Jerseyville, Ill., in 1957 to study forestry at the University of Montana in Missoula. Instead, he acquired undergraduate degrees in journalism and sociology in 1961 and later earned a master's degree in sociology.

"I've always enjoyed the outdoors," Howell said. "I came to Montana to become involved in forestry, but I didn't do that. When I began consulting for the department, it renewed that interest in the outdoors and it filled a void for me."

Howell's varied occupational background includes work for the Washington State University publications department, a five-year stint as director of information and development at Montana Tech, and promotion work for the Seattle World's Fair and

TOM WARREN

F.W. "Bill" Howell

Chet Huntley's Big Sky Resort.

A resident of West Yellowstone since 1975, Howell is involved in the town's tourism and recreation industry. The bulk of Howell's business interests fall under the corporate umbrella of Yellowstone Tour Travel, a promotion company owned by Howell and his business partner that handles advertising for the partnership's five motels, two restaurants, a snowmobile dealership, and a dude ranch.

Despite his busy schedule, Howell has found time to raise horses, train bird dogs for waterfowl and upland game bird hunting, pursue his interest in trapping and outdoor photography, and to instill his enthusiasm for hunting and fishing in his two teen-aged sons. "My youngest son shot his first bull elk when he was 12," Howell said admir-

ingly. "I was 30 years old before I shot my first bull elk!"

Howell suspects his interest and involvement in a variety of recreation business endeavors, combined with his earlier conservation consulting for the DFWP, had a hand in his appointment to the Montana Fish and Game Commission. "I think that had something to do with Gov. Schwinden considering me," Howell said. "A lot of decisions in the future are going to have to deal with total recreation, not just with wildlife. Recreation, tourism, and the use of public and private land are all going to play key roles in Montana's future."

Howell is a past president of the Montana Snowmobile Association and a member of the West Yellowstone City Council. "Sitting on the Montana Fish and Game Commission is going to be interesting," he said. "Our wildlife resource is very valuable, and recreation is a part of that resource. Actually, when you think of hiking, camping, boating, and fishing, the quality of recreation in Montana exists because of the wildlife."—*Tom Palmer, Conservation Education Division, Helena.*

Voluntary Reservations On the Smith

By implementing a new voluntary reservation system, the Montana Department of Fish, Wildlife and Parks (DFWP) has let Smith River users decide for themselves what kind of floating experience they want to have.

In 1986, over 2,000 people floated this scenic central Montana river. Its 61-mile course begins 25 miles north of White Sulphur Springs and terminates at Eden Bridge, about 18 miles east of Ulm. Since the late 1970s, the number of floaters visiting this river during the summer has increased annually. In turn, many floaters and landowners along the river believe the river has become overcrowded.

By referring to floater registration cards used on the Smith River, we know that nearly 50% of the floaters began their trips on a Friday or Saturday. Registration cards also showed that Memorial Day weekend and the last three weekends of June traditionally receive the heaviest use of the entire float season.

The department's objective was to spread this concentration of use to other days of the week and throughout the float season. Obviously, a working voluntary system is preferable to other forms of use restrictions such as closures, permits, or mandatory reservations. In an attempt to disperse traffic, during the 1986 float season a voluntary reservation system was implemented for the first time on the Smith River.

To make a reservation, floaters should call the Region Four (Great Falls) DFWP office (406/454-3441). You will be asked: your name and address, the number of people in your party, when you want to begin your trip, the estimated time of put-in, the number and type of craft, and the number of days you plan to be on the river.

You might be told the river will probably be crowded on the dates you want. You might decide to choose alternate dates to avoid crowds, but you won't be stopped from choosing any date you desire.

To avoid high use, ask your group to consider avoiding what might be thought of by most floaters as a "crowded" time, and try to keep schedules flexible enough so you can begin your float on a less crowded day or during a less crowded time.

Another advantage is that when you call the Region Four office to make the reservation, you are also given current river floating conditions and other helpful information.

The department took great pains to inform all possible floaters of the voluntary reservation system. In spring 1986, we explained the system during three Smith River public hearings. Several newspapers printed stories about it, and it was described in a supplemental flyer placed in the "1986 Smith River Guide."

Over 75% of the groups floating last season voluntarily registered, and the department is pleased with this first season's success. When examining the information collected at the registration boxes for 1986 and comparing it with past years, we found the number of floaters beginning their float on Friday decreased slightly; Saturday numbers remained the same. The most significant figures were on Tuesday—a 6% increase over 1985 in the number of floaters beginning their trips.

We believe that as more people learn about the voluntary reservation system, more people will also use it. We believe the floater who seeks solitude will use this program to advantage by avoiding traditionally popular times on the river. Those not so concerned with solitude or those with more rigid vacation plans will at least know what to expect.—*Gary "Woody" Baxter, Parks Division, Region Four (Great Falls)*

A Big Boost to the Bighorn

Montana's bighorn sheep, big game hunters, and all others who enjoy this splendid wildlife resource were the real winners in auctions for bighorn sheep licenses this year and last.

The 1985 Montana Legislature authorized the Fish and Game Commission to auction one bighorn sheep license each year to provide money for the benefit of the state's bighorn sheep populations.

TOM WARREN

The Helena Chapter of the Rocky Mountain Elk Foundation (RMEF) presented a check for $2,140 to the Helena National Forest and the Department of Fish, Wildlife and Parks. The check was presented by 1986 RMEF chapter chairman Charles VanHook (right) to Forest Supervisor Bob Gibson (center) and DFWP Director Jim Flynn. The contribution will be used for elk habitat improvement in the Elkhorn Mountains, southeast of Helena.

This direct contribution will be matched by a congressionally approved "Challenge Grant" program—every dollar raised privately and spent on national forest land for wildlife will be matched by the Forest Service. The U.S. Forest Service recently signed a national agreement with the RMEF with the goal of enhancing elk management through shared projects on elk habitat.

The specific project in the Elkhorns involves a prescribed burn on Forest Service lands to increase forage on winter range. DFWP personnel will monitor results of the burning for several years under a contract between the two agencies.

Funds contributed by the Helena chapter were raised at a banquet in Helena in October 1986. Jeff Brandt, 1987 RMEF chapter chairman, reported this year's banquet will be conducted Oct. 2.

The first Montana license was auctioned by the Foundation for North American Wild Sheep (FNAWS) at its annual convention in Honolulu last March (see "The Catchall," *Montana Outdoors*, May/June 1986). The successful bidder, who paid a record $79,000 for the opportunity to hunt sheep this past fall, hunted 16 days in western Montana and harvested a large ram. This year, another license was auctioned at the foundation's convention in Nashville. The $109,000 paid for this license is unprecedented in the history of special license auctions for sheep.

The sheep license auction provides funds for the Department of Fish, Wildlife and Parks (DFWP) sheep management program and will supplement dollars already being spent by the department.

Interest in bighorn sheep and sheep hunting in Montana is keen. Last fall, the DFWP offered 610 bighorn sheep hunting licenses across the state, in 25 hunting districts. Almost 8,600 hunters applied for these licenses. Only 107 of the available licenses allowed the taking of a mature ram; these licenses garnered the most interest with 7,870 applicants. The remaining licenses were for ewes, young rams, and "legal" rams in "unlimited" hunting areas. In the seven "unlimited" areas, 363 licenses were issued for a total harvest quota of 18 "legal" rams.

With such a high demand for limited bighorn sheep hunting opportunities, the DFWP is beginning to use the newly acquired funds from the auction to start new sheep herds in suitable, but unoccupied, habitat. This winter, sheep were trapped and transplanted into three new areas: near Ranch Creek and Bonner, both east of Missoula, and along the Boulder River near Big Timber. If the transplants are successful, these new herds will provide additional hunting opportunities in the future.

Besides starting new herds, the DFWP will use the funds for research efforts on sheep population dynamics and allowable rates of harvest. A better understanding of these important factors may lead to more precise management of the state's bighorn sheep populations, thus ensuring maximum benefits to sportsmen and the long-term success of the sheep herds.

The new funding will also benefit bighorn sheep habitat. Plans call for protecting, preserving, and enhancing critical sheep range primarily through land, lease, and conservation easements. Burning, to rejuvenate plant growth for better forage production on winter range, also is planned in some areas.

Montana's sheep license auctions provide an opportunity for fortunate sportsmen to pursue trophy bighorn rams in the wilds of Montana. But the real winners include the sheep themselves and all who value them.—*Bill Thomas, Region Two (Missoula) information officer*

An Outdoor Classroom For Everyone

Going to school in the summer?

The very idea may sound hot, boring, and about as appealing to Montanans as a winter vacation in Antarctica. However, if Glacier National Park is your classroom, a spectacular world of mountains, wildlife, flowers, and glaciers is yours to absorb and enjoy.

For three years, the Glacier Institute has offered a program of college-level courses that stress the outdoor experience by doing. If you take one of the institute's summer classes, you might backpack deep into the park to explore the life cycle of a glacier, or float down the North Fork of the Flathead River, stopping to examine early 20th century homesteads, wolf habitat, and ancient geologic features. With your day pack and lunch on your back, you might hike through a recent forest fire or fields of alpine wildflowers. Perhaps you'd rather set up your tripod and camera by a mountain stream and see what you can capture on film.

Whatever subject you decide to delve into, the Glacier Institute probably has a course to deepen your interest. This summer's array of natural science classes includes geology, alpine wildflowers, wildlife, fire ecology, glacial dynamics, plant ecology, the North Fork country, and grizzlies. "People of the Mountain World" is for those who would like to learn about Blackfeet Indian culture and try some of the old ways of beading, quilling, tanning, tracking, and stalking. A course in color photography is consistently popular and has expanded to two beginning classes and one advanced session. A special course for teachers is offered in late June.

Depending on the subject, classes run for two to five days. Many two-day classes are scheduled on weekends so those who work can participate. Auditing or credit options are available—lower division credits through Flathead Valley Community College and upper division credits through the University of Montana. Cost for the courses ranges from $80 to $205.

A series of non-credit "Exploration" classes is a new addition to the institute's program. These are one-day outings for individuals or families wanting to learn while exploring Glacier together. Discovering wildflowers, orienteering, birding, wildlife tracking, sketching, and astronomy are offered throughout the summer. Cost is $15 for individuals, $25 for two family members, and $6 for each additional family member.

The Glacier Institute summer office is in the park, about one-half mile past the entrance gate at West Glacier. All classes begin and end at this facility which includes an office, meeting hall, and cabins for participants who choose to stay at the camp.

Registration by mail before June 10 will usually ensure space in a class, although a few popular sessions fill before that date. If space is available, walk-in or phone registrations will be taken until the beginning of each class.

For a brochure or more information, contact: The Glacier Institute, P.O. Box 1457; Kalispell, MT 59434 (406/752-5222); after June 19, contact The Glacier Institute P.O. Box 527; West Glacier, MT 59936 (406/888-5215).—*Ursula Mattson, The Glacier Institute*

URSULA MATTSON

NONGAME NEWS

NONGAME SYMPOSIUM

Montana's third annual Nongame Wildlife Symposium was conducted Feb. 11, 1987, in Kalispell. More than 150 people attended the all-day event and listened to talks on diverse topics, ranging from tailed frogs to bald eagles. Other highlights were an all-day poster session, a panel discussion on the ecological aspects of old growth, and a premiere showing of the new Department of Fish, Wildlife and Parks (DFWP) film, "The Last Parable." The event, held in conjunction with the annual meetings of the state chapter of The Wildlife Society for the past two years, has continued to grow in popularity and represents the largest gathering of nongame wildlife enthusiasts in the state.

Tom Hinz, DFWP waterfowl biologist from Billings, kicked off the morning technical session by discussing winter distribution of bald eagles in southeastern Montana and the effects of waterfowl, ice patterns, and recreationists on eagle use. Dave Genter, Director of Montana's Natural Heritage Inventory Program (The Nature Conservancy), summarized the status of nongame fish in the state, a resource frequently overlooked and, in many cases, poorly understood. Building a concept of public ownership of nongame was the theme of a talk by Mike Hillis, a biologist with the U.S. Forest Service (USFS). In summarizing efforts to create wildlife viewing opportunities on the Lolo National Forest, he emphasized that putting people in contact with nature is an important step in gaining public understanding of nongame wildlife. Art Aylesworth, an insurance salesman from Ronan, discussed the importance of citizen awareness and effort. The recovery of the western bluebird in western Montana is largely due to Aylesworth's initiative in establishing a network of nest box trails (see "Nongame News," *Montana Outdoors*, March/April 1986).

Habitat needs of specific nongame species were emphasized during the latter half of the morning technical session. Lew Myers of the Bureau of Land Management in Dillon discussed the nesting ecology of the ferruginous hawk, a statewide species of special concern dependent on relatively undisturbed grassland. Dr. Richard Douglass from Montana Tech in Butte talked about innovative research using radio collars on deer mice to determine habitat selection. He found that radiotelemetry results indicated different habitat use patterns than the standard live-trapping techniques revealed. Dr. Richard Wallace from the University of Idaho discussed the natural history of two unique amphibians. The tailed frog, adapted to life in swiftly moving streams, is a species of special concern in Montana (see "Nongame News," *Montana Outdoors*, May/June 1986). The Pacific giant salamander, while not verified in Montana, lives in nearby Idaho mountains and similarly depends on mountain streamside habitat.

Rosalyn Yanishevsky of Resources Ltd., Polebridge, presented the final talk of the technical session. She discussed the forest planning process as it relates to old growth forest and nongame; planning efforts differ sustantially from forest to forest in Montana. Her talk led into the afternoon panel discussion, "Old Growth Forests—What are They and What are Their Values?" This session, chaired by Bill Ruediger of the USFS, underscored the ecological characteristics and values of old growth. Dr. Robert Pfister of the University of Montana described his efforts to develop a classification scheme for old growth forest types on the Nez Perce National Forest. Dr. Charles Meslow from the University of Oregon discussed the use of indicator species, including the spotted owl and the pileated woodpecker, as a means of developing minimum acreage requirements for forest management. Dr. Fred Gilbert, Washington State University, talked about management goals and the community approach for identifying old growth sites. The ensuing discussion indicated that nongame species play an important role in old growth management.

No nongame symposium would be complete without a summary of where we've been and where we're heading. Mike Aderhold, DFWP information officer for Region One (Kalispell), noted that nongame wildlife has been a part of our cultural heritage since white man arrived in this country (and that it was part of the Indians' cultural heritage before that).

Interest in all wildlife grows yearly, with over 60% of the nation's population participating actively in observing wildlife as a recreational pursuit. Increasing interest in nongame wildlife in Montana is exemplified by the continued growth in attendance and scope of this annual symposium, which began as a half-day working session in Missoula two years ago. The rising popularity of Audubon Christmas Bird Counts is a further example of this expanding interest in nongame. As described by Daniel Casey, DFWP biologist from Kalispell, these counts are the most systematic, widespread, long-term source of bird distribution data available for the state. There is need for further standardization and computerization, however, before this information can be used to its fullest potential.

Dennis Flath, DFWP state nongame biologist, summarized the state nongame program, emphasizing his role and the history of the nongame checkoff. Flath presented a summary of the performance of the nongame checkoff for the three years it has been on Montanans' tax forms:

TAX YEAR	Number eligible	Percent contributing	Average donation	TOTAL
1983	175,000	3.8	$5.34	$35,427
1984	174,913	3.5	5.47	33,810
1985	366,690	1.1	7.69	31,869

Reduced participation for the 1985 tax year can be attributed to two additional checkoff boxes on the tax form. Average donations climbed dramatically as those not receiving a refund became eligible to contribute, indicating a broader base of financial support for the program which may have gone untapped in 1983 and 1984. Montana residents continued to contribute at a level comparable to those in other states with similar programs.

The meeting ended with two entertaining programs, a guest speaker and a film on wild land values. Larry Thompson, noted Montana naturalist, author, and artist, talked about the childhood experiences and field exploits common to those interested in nongame species. Symposium participants were then treated to the premiere showing of "The Last Parable," a film produced by the DFWP to describe the value of Montana's wild lands and of the many outdoor pursuits so important to our Montana life style. (Copies of the film can be borrowed, free, from all regional DFWP offices).

Perhaps the biggest benefit that comes from these annual symposia is the opportunity for people in the private sector, government agencies, and the university system to communicate.

Copies of abstracts for papers and posters presented at the 1987 Nongame Wildlife Symposium, and a limited number of additional materials (bibliographies, draft reports, checklists) are available from: Daniel Casey, wildlife biologist, Department of Fish, Wildlife and Parks, P.O. Box 67; Kalispell, MT 59903.

TWO BUCKS, PLEASE

We reported in a previous issue that "Snake River Birds of Prey" is available from the Bureau of Land Management, Boise District Office, 3948 Development Ave.; Boise, ID 83705. We reported the 52-page brochure was free; instead, it costs $2, and your check or money order should be made out to the Department of the Interior.

LOUIS M. KIS

DU—

Launching Waterfowl's Lifeboat

by Tom Palmer

So many of the long stretches of open country highway in Montana are marked less by towns than by saloons. Ovando, an easy bump on Highway 200, is like that. The saloon is Trixi's.

For many travelers, the Ovando Valley often becomes Trixi's Saloon and not the glacial basin hunkered in the rough pocket of sagebrush and tufted fescue grass formed by the Swan and Garnet ranges, and the Rattlesnake Mountains.

The cold and ever clear Blackfoot River cuts the valley in two and then skirts its southwestern border before banking south on a hard charge to meet the Clark Fork. Pothole marshes pock the valley's blistered hills where cattails drink the swale as through a straw. The cattails grow as straight as cane poles in their oasis, surrounded by dryland farms and acres upon acres of sagebrush grown arthritic from lack of water.

The terrain is classic "kame and kettle" topography: smoothly stratified mounds and hills—the work of sediment released, deposited, and molded by glacial meltwater—and a series of small, nearly undrainable hollows backhoed by glacial drifts. Like the dramatic kame and kettle of the Scottish highland, the North Dakota prairie, and the expansive Canadian pothole country, the Ovando Valley is classic waterfowl habitat in miniature. And that, possibly in addition to good old Trixi's, is what

caught the eye of Ducks Unlimited when it came to the valley to examine Kleinschmidt Lake.

"When I was a kid, you'd look out there and the meadow would be white with snow geese in the spring," said Tom Geary, a feisty Irishman whose homesteading forebears were advised to abandon the valley by "pony soldiers" warning of Chief Joseph's advancing Nez Perce war party.

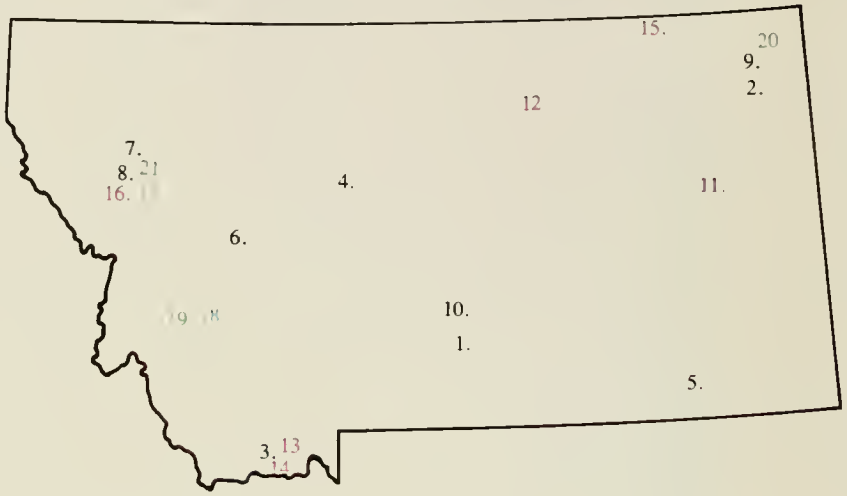
Years ago, when the skies would turn dark with migrating waterfowl, the Ovando Valley was known both for its saloon, so inviting to the wayfarer, and the terrain, which was so inviting to ducks and geese. "Hunting season always opened on a Sunday and the night before the season opened there'd be the Duck Dance in Ovando," Geary recalled. "People never went to bed and the saloons would be full and the shooting would be intense."

Those were the golden years for North American waterfowl, before the calamitous drought of the 1930s struck. Geary remembers a mistless spring many years ago when he watched newly hatched ducklings waddling weakly over the dry horse trails to family-owned Kleinschmidt Lake. The locals have always known Kleinschmidt Lake as "Corral Lake," the place where the work horses were kept during the haying season, and that is how Geary still refers to the marsh. Yet, among all the fond memories a lifetime in rural Montana can offer, the devastating and lasting effect the great drought had on the ducks at old Corral Lake still causes Geary to shake his head sorrowfully. "Oh, I sure remember," he said, then pulled the bill of his Scotch cap down to his eyebrows as a vision of doomed ducklings, kicking up grim clouds of dust, emerged like a haunting apparition.

That drought, which plagued the western half of North America, also launched the formation of Ducks Unlimited (DU). The group, now in the midst of its golden anniversary celebration, immediately began to raise funds in the United States to restore drought-ravaged portions of Canada's pothole prairies. The regions that were not going dry were rapidly being displaced, removed from the landscape by the farmer's plow.

Today, there are 600,000 card-carrying DUers worldwide—a mix of sportsmen and bird lovers—who have

Montana's DU Projects



Projects completed
1. Big Lake•
2. Katy Lake
3. Sparrow Slough
4. Benton Lake National Wildlife Refuge
5. Rocky Crossing**
6. Kleinschmidt Lake*
7. Pablo National Wildlife Refuge
8. Scoonover Dike
9. Lake Creek Flat
10. Halfbreed Lake

Projects under construction
11. Fox Lake•

Projects awaiting final permits
12. Sleeping Buffalo Wildlife Management Area
13. Lower Red Rock Lake
14. Centennial Valley***
15. International Marsh
16. Jensen Project*

Projects under design

Projects approved for detailed investigation
19 Greene's Pond*
20. Medicine Lake
21 Dike 80*

*Montana Department of Fish, Wildlife and Parks (DFWP)
**U.S. Forest Service
***Bureau of Land Management (BLM)
•DFWP & BLM
Other projects are managed by the U.S. Fish and Wildlife Service

contributed almost $400 million toward the group's "singleness of purpose": to develop North American waterfowl habitat.

Until 1984, DU's habitat program was almost exclusively carried out on private lands in the Canadian regions—the famed "duck factories" —responsible for producing 70% of all the waterfowl in North America. There are 3.7 million wetland acres in Canada maintained by DU and another 280,000 acres under its management in Mexico.

Beginning in 1984, however, DU embarked on its U.S. Habitat Program. DU identified the five states that account for 85% of the waterfowl hatched in the United States and prepared to provide megabucks for ducks by funding wetland projects in Alaska, the Dakotas, Minnesota, and Montana.

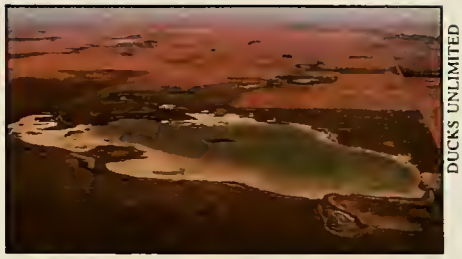
DU estimates that it has 132,500 acres of wetland enhancement projects completed or being developed under 80 U.S. Habitat Programs. In Montana, DU has already completed 10 projects; two projects are under construction; and 13 more are either awaiting final construction permits, are under design, or are on the books for serious investigation.

Kleinschmidt Lake,with its predator-free nesting islands, new dam, and water control structures, is among the 10 DU projects completed in Montana.

"Because of the pothole nature of this valley and the water that's available, we've always thought this area had a lot of potential for waterfowl nesting," said Lyn Nielsen, a Department of Fish, Wildlife and Parks (DFWP) wildlife biologist. For Nielsen, the kame and kettle terrain has long stirred memories of his North Dakota prairie pothole homeland. In 1980, with the approval of Tom Geary and his six brothers, Nielsen planted several geese on and around Kleinschmidt Lake with the hope of crystallizing a small part of his own youth and reviving the memory of the golden days, fat with geese and ducks and shorebirds and duck hawks —the days Tom Geary has never allowed himself to forget. The transplants have taken hold and now officials estimate that Kleinschmidt Lake supports about 30 nesting pairs of geese.

"We like to see those geese come back here and we like the ducks," Geary said. "There's not too many places left for them to go."

With the new DU-built nesting islands, dikes, and control structures, Kleinschmidt Lake's waterfowl production—secure from skunks, raccoons, foxes, and other night-prowling duck connoisseurs—could double or triple in just a few years, when the vegetation provides ample cover. The site already attracts an unusual spectrum of ducks for Montana. There are "dabblers" like mallards and gadwalls, but there are also small colonies of "divers"—redheads and swift-of-wing canvasbacks that will benefit from the inviting edge-water improvements DU has fashioned at Kleinschmidt Lake.



DUCKS UNLIMITED

The Katy Lake project in northeastern Montana was enhanced by creation of a two-acre nesting island in the center of the lake.

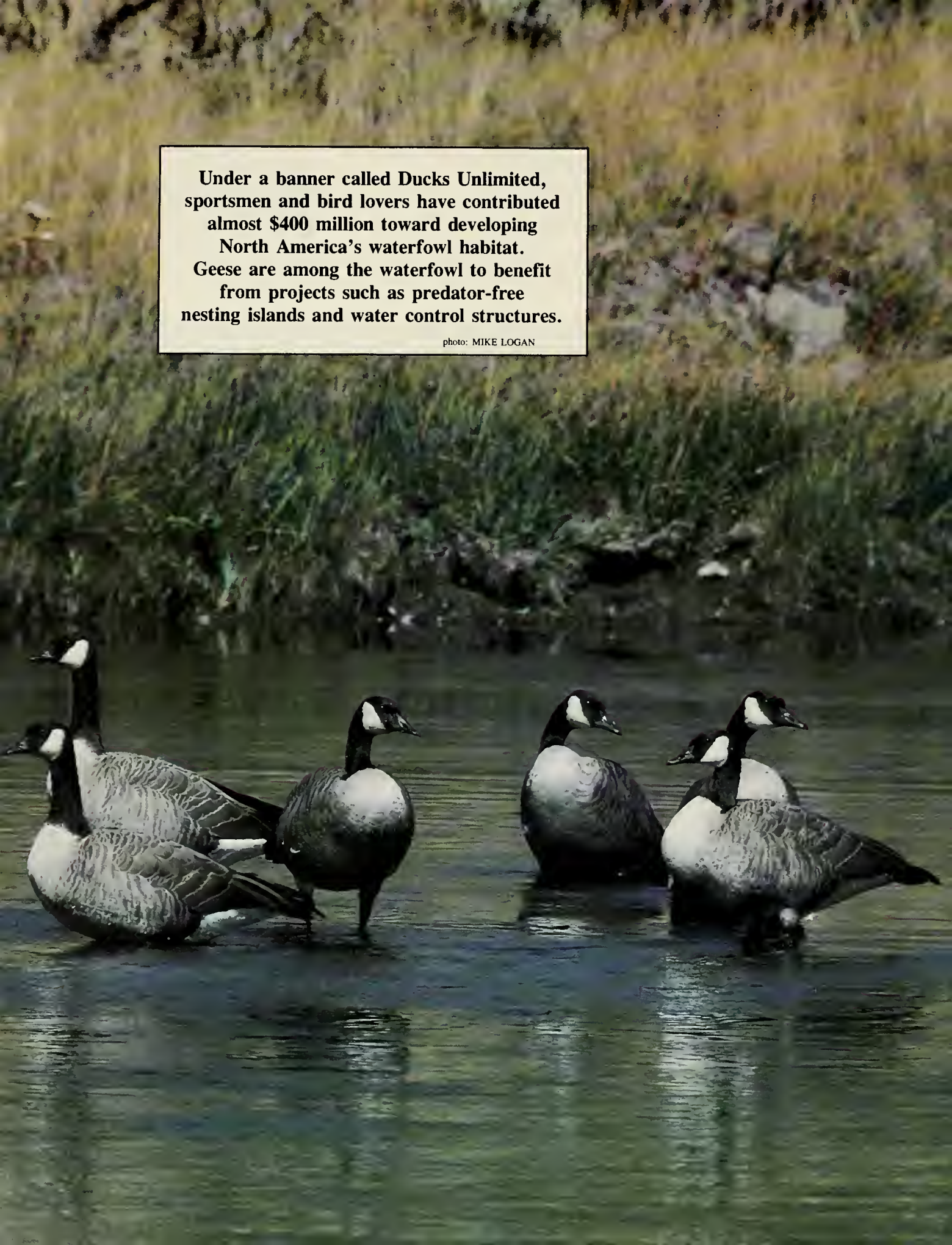
BLM photo

Kleinschmidt Lake is one of 10 DU projects recently completed in Montana. One of the improvements (above) involved adding fill to build up a submerged island, making it a permanent waterfowl nesting site. Other improvements included cutting off several peninsulas to form islands (below), which offer nesting areas secure from skunks, raccoons, and foxes.

BLM photo

The price tag on this waterfowl Hilton was $120,000, but $63,000 of it came from the Bonneville Power Administration (BPA). The federal agency was obliged to offer the money under its 1983 agreement with the Montana Department of Natural Resources and Conservation to help mitigate waterfowl mortality caused by collisions with power lines draped over the Missouri River.

After more than two years of negotiations between three federal and two state agencies—including the DFWP—everyone agreed that Kleinschmidt Lake would be an ideal wetland to develop with the BPA money. In past years, the U.S. Fish and Wildlife Service has shown an interest in the Ovando Valley's peculiar potholes and has taken easements on a number of the wetlands.



Under a banner called Ducks Unlimited, sportsmen and bird lovers have contributed almost $400 million toward developing North America's waterfowl habitat. Geese are among the waterfowl to benefit from projects such as predator-free nesting islands and water control structures.

photo: MIKE LOGAN

All the private landowners involved—the Gearys and two fence-line neighbors—readily agreed to cooperate with the wetland development by offering 30-year conservation easements. Even with that spirit of cooperation, however, the project appeared tethered to governmental red tape. It wouldn't fly...until DU recognized the potential of Kleinschmidt Lake.

"Kleinschmidt Lake is really the key to what we can do in Montana," said Don Childress, assistant administrator of the DFWP's Wildlife Division. "You had several public agencies involved, positive landowners, and a private conservation organization working together. The results of the development of Kleinschmidt really show what DU can do and how this U.S. Habitat Program can work."

A good-sized lake, 47 quarter-acre potholes, three conscientious landowning families, and a handful of cooperating public agencies are the main ingredients for DU duck soup. Once all the minor paperwork was in order, DU had the Kleinschmidt Lake project engineered and designed, hired the contractors, directed the construction, came in for a final inspection, picked up the tab, and turned the wetlands over on a silver platter for DFWP to manage. "DU never even batted an eye," Nielsen said.

That phantom style, waterfowl's Lone Ranger coming to the rescue of troubled wetlands, has been the hallmark of DU's U.S. Habitat Program.

Since DU launched its ambitious U.S. Habitat Program in 1984, 25 of 32 Montana projects offered to DU have either been developed or are on-line for future development. In those three years, DU has spent $2 million for Montana wetland development.

"In the spring it's going to be a real marsh scene," Nielsen said during a visit to Kleinschmidt Lake in February. The site was still frozen, quiet, and swaddled in ankle-deep snow. "It's going to become a living waterfowl area, but without the help of DU, two-thirds of this area might have never been developed."

Unlike the lion's share of its conservation work in Canada, in the United States DU has turned to enhancing and developing wetlands under public, rather than private, ownership. In that way, Kleinschmidt Lake, with its wide swath of private landholdings, is a notable exception.

DU maintains that its mandate to work within the perimeters of publicly owned land evolved from the relative abundance of it that could benefit from wetland development. The land is generally lying there with its best use mapped out. But, DU says, until recently, there wasn't enough money to grease the gears of extensive U.S. wetland development because of the critical work that needed to be performed in Canada's "duck factories."

The watershed year came in 1984 when DU donations began to roll in at nearly a $1-million-a-week clip. That's when DU announced that its income level would allow it to develop stateside waterfowl habitats. And with DU establishing a higher profile in the pothole regions of the United States, the DU money for publicly owned wetland enhancement projects is virtually there for the asking.

"When we originally started this program, the feeling was that all of a sudden somebody's giving something away for nothing," said Bob Hoffman, DU's chief biologist at its new North American Habitat Field Office in Bismarck, N.D. "It wasn't easy getting proposals. At first they came in slowly, but now proposals are coming in all the time and we're hoping to get more as time goes on. Right now we're considering anything that comes in."

Even with DU's storybook success, nearly 40% of western Canada's "duck factory" wetlands have vanished. In the United States, more than 400,000 acres of wetlands disappear each year. The apparent results of such a drastic and steady loss of waterfowl habitat were assessed last year by waterfowl biologists who routinely keep tabs on the 10 most popular waterfowl species. The data showed only 31 million breeding ducks in Canada and the United States, the second lowest number ever recorded. Clearly, the waterfowl resource is in trouble.

Although Montana—at least compared with Canada and the Dakotas—historically has never been a pivotal region for duck breeding, each newly developed or enhanced wetland is another lifeboat launched for the use of waterfowl.

On central Montana's Benton Lake National Wildlife Refuge, long recog-

MARSH Money—A Good Deal

Although Ducks Unlimited (DU) has spent $2 million in Montana since 1984 for wetland development, it has made an additional $85,000 available to the Department of Fish, Wildlife and Parks (DFWP) for further wetland construction projects.

Under DU's Matching Aid to Restore State's Habitat (MARSH) program, state wildlife agencies are provided with matching funds to be used to conserve local waterfowl habitat.

State wildlife agencies can receive either outright grants or matching funds for projects, depending on how much money the agencies contribute to DU. Montana, which does not contribute directly to DU, will participate in the MARSH program by matching DU dollar for dollar with state duck stamp monies. (Last year, Montana's first-of-state waterfowl stamp generated more than $350,000 in revenue for wetland enhancement projects; Montana will use a portion of this money for MARSH participation.)

Each state is eligible to receive up to 7.5% of the net income raised by DU within its borders. In Montana, $1,164,000 has been raised by DU since 1984. To receive the MARSH money, the state wildlife agency must submit potential conservation projects and management plans to DU's staff.

Although Montana has yet to submit a site-specific plan under the MARSH program, DFWP Wildlife Division Administrator Arnie Olsen said that MARSH money will be put to use this year. "It's a good deal and we're not going to pass it up."

nized as one of the most productive waterfowl refuges in the United States, DU recently invested $650,000 in a wetland enhancement project that has become a waterfowl production showcase.

In 1985, DU financed construction of a new 330-acre pond, an 8,140-foot dike, three new nesting islands, and a predator-thwarting moat around a portion of the wetland. At the time, Benton Lake represented DU's largest U.S. Habitat Program.

The following spring, DU biologists and Benton Lake's Wildlife Manager Bob Pearson conducted a shoreline nest search on just 12 acres of the new project and discovered what DU's Hoffman called "phenomenal, unbelievable production."

Under ideal conditions, experts agree that one nest per acre is mighty fine production. In the spring of 1985, before the DU project was constructed, Benton Lake's dense nesting activity was a healthy 1.5 nests per acre. The spring following completion of the project, biologists found 86 nests on the 12-acre survey site—more than seven per acre—numbers that can cause duck lovers to swoon. "We were surprised," said Steve Bayless, DU's Montana representative. "It was beyond all expectations." At a time when good nesting success rates—nests that produce and fledge young—run in the neighborhood of 6% to 18% the DU-enhanced Benton Lake wetlands turned in a scorecard that showed 70% of the nests fledging their young. Imagine a Major League baseball team with the entire lineup hitting .425 and four pitchers with ERAs below two and you get an idea of just how significant DU's contribution to the Benton Lake system has been.

"DU came in here and turned a dry lake basin area into 330 acres of marsh habitat," Pearson said. "A project of this magnitude probably wouldn't get approved, or it would take years to get it through the bureaucratic channels to get it funded. I don't think it would ever have been done without DU."

DU never batted an eye. "Some people would have liked to see DU come into the United States a lot earlier," said DFWP Statewide Waterfowl Coordinator Jeff Herbert. "But now they're here and they're here in a big way. What's most refreshing about DU, they've come in as a private operation and they're rapidly getting things done."

DAVE BOOKS

Childress, a hard-core waterfowl enthusiast, has laid much of the groundwork for the eight DU-funded projects that are or will be managed by the DFWP. He says since DU has begun its efforts to develop Montana wetlands he has seen what he calls "a new waterfowl awareness" emerging.

"It's starting to lend a new perspective, a viewpoint that waterfowl are important and that there are things we can do right here to start turning things around. I keep looking at Kleinschmidt Lake and I'm amazed because of the diversity of people and agencies involved," he said. "I hate to call it a wildlife ethic, but my feeling is a lot of times all you have to do is give people the opportunity to be involved and they'll get involved. I think DU has done that."

Fifty years ago, when the Ovando saloons were full and the valley danced in celebration of the fall migration, Tom Geary was a boy. Then in spring, he'd see the valley turn white with geese the color of snow. Those are wonderfully rich, lasting images, but just images nonetheless. "I'd like to see it again," Geary said.

DU is out to prove that that is not too too much to ask for.■

On central Montana's Benton Lake National Wildlife Refuge, DU invested more than half a million dollars for a wildlife enhancement project that has become a waterfowl production showcase. Improvements include a new pond, three new nesting islands, and an 8,140-foot dike. The inlet structure pictured below (under construction) allows water to be diverted into the new pond, and an outlet structure controls water level for optimum waterfowl use.

DUCKS UNLIMITED

MIKE GURNETT

WHAT'S BUGGING THAT FISH?

by Jim Peterson

Hello. Fish, Wildlife and Parks Fish Health Lab."

"Hi. I was fishing last week on the Yellowstone River near Columbus and I caught a strange looking fish. It was a brown trout, real skinny, and it had white, fuzzy patches all over its head and back. Do you know what was wrong with it?"

"It sounds like a fish affected by some kind of stress, possibly related to spawning. Those white spots are patches of fungus growing on the skin of the fish. Did you save the fish so I can take a look at it?"

"No way! I threw it back in the brush."

* * * * *

"Good morning. Fish Health Lab."

"Good morning. Say, what's wrong with all the fish at Cooney Reservoir? I'll bet I caught a dozen of them and they all had these little black spots on their sides and fins."

"Those black spots are tiny trematodes, or parasitic worms, that embed in the muscle just under the skin. They don't hurt the fish and they're not harmful to humans. Just make sure you cook the fish well before you eat them."

"Not me! I threw 'em all back. I don't want to eat any wormy fish."

* * * * *

These telephone conversations are

JIM PETERSON

Tapeworms. **Both larval and adult tapeworms may be found in fish. The long, white worms inside the intestine are usually adult worms, while larval worms are found in the body cavity or in various organs. Larval worms require another animal (usually a bird or mammal) to complete their life cycle. One species, *Diphyllobothrium latum,* develops in humans, but this species is not found in Montana.**

JIM PETERSON

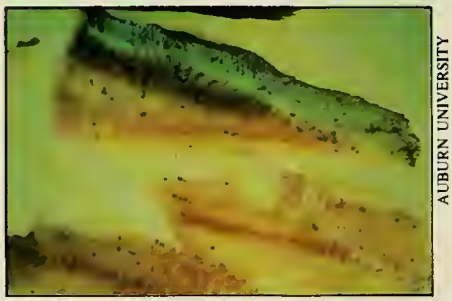
Predators. **Some mammals and birds are extremely efficient fishermen. These scratches were caused by a bird. The fish got away but died later.**

BOB SEMPLE, USFWS

General septicemia. **General bacterial infections can occur, especially when fish are under stress. Specific pathogenic bacteria can cause fish disease, although infections are usually caused by common water or soil bacteria. These bacteria often result in fish kills involving large numbers of fish. Lab testing is required to identify the species of bacteria involved.**

JIM PETERSON

Parasitic copepods. **These external parasites can sometimes be seen with the naked eye. This one is *Salmoncola,* and it can cause severe gill damage.**



AUBURN UNIVERSITY

Black spot disease. **This infection just under the skin of many Montana game fish species is caused by small worms (larval trematodes).**

USFWS

Fungus. **Fungus attacks weak or injured fish; heavily infected fish generally die.**

examples of calls received at the Montana Department of Fish, Wildlife and Parks Fish Health Lab. The fishermen asked important questions, and they made thought-provoking points. Diseased or parasite-infected fish don't look very appetizing and certainly nobody wants to eat a wormy fish. But a little understanding of *why* a fish looks sick and how it got that way can reassure us that most fish are healthy and we don't have to be concerned about eating them.

Fishermen rarely catch the really sick fish in lakes or streams. Such fish do not actively feed, and they won't bite a hook. These fish die, mostly unnoticed. Occasionally, a sick fish will be caught, giving a fisherman immediate cause for concern. These are usually isolated situations involving only a few fish stressed by an injury or some environmental condition. A disease seldom kills large numbers of fish, although it does happen occasionally.

Whether a single sick fish is found or disease results in a major fish kill, the cause can usually be traced to trauma or some sort of stress in the fish's environment. Poor water quality, pollution, unsuitable habitat, spawning activities, and injuries are factors that could weaken a fish. A healthy fish has an unusually good natural defense system and can counter disease threats with its immune system. Stress reduces the fish's ability to deal with disease, and once a disease takes hold of a stressed fish, death often results.

Parasites fall into a different category than other disease-causing organisms like bacteria or viruses. Parasites of various kinds are quite common in many Montana waters. We might see a parasite on a fish, even though the fish doesn't look at all sick. Parasites don't like to kill their hosts—it's not good business. However, when parasites become abundant, they can be a stress factor that contributes to an unhealthy condition.

In diagnosing fish disease, many times we can determine what the fish was infected with or from what it died. But the important question is: What *caused* the condition? What's wrong in the environment that stressed that fish and weakened it to the point it became diseased?

The only way we have of knowing a fish health problem exists is when fishermen call and let us know they caught a sick fish, or saw sick or dead fish. Those calls are very much appreciated. One other way of figuring out what is going on is to talk to the fish:

"Hello. Fish Health Lab."

"Hi. I live in Georgetown Lake. Things are getting pretty tough here. I'm having a rough time breathing under the ice. I itch like crazy, and I have cramps. I don't feel good, and I just can't eat a thing."

"Thanks for calling. It sounds like the long winter is getting to you. Try to find a place with a little more oxygen. External parasites are probably causing the itching. I suspect you've got protozoan parasites in your intestine, causing an irritation and keeping you from eating. But you must eat and get your strength up because you're on your own out there! Try to hang on until spring."

Fish are very much subject to the quality of the environment in which they live. Even though many of the organisms that cause fish disease are constantly present in the fish's environment, they seldom cause disease under good environmental conditions. When these organisms infect fish, they can result in

continued on page 26

READERS RESPOND

Photo Issue Chronicles Nature's Beauty

This "Mich-i-gander" really enjoyed your Special Photo Issue—excellent magazine! I look forward to each issue. It's a touch of the West that I haven't seen since the late '70s.

Your theme also was a good choice for the photo issue. It's a part of conservation that we all too often take for granted or simply don't think about.—*Dave Brower; Zeeland, Mich.*

* * * * *

You certainly know how to bring a tear to the eye—especially to the eyes of a couple of old Montanans out here in Wisconsin. You really outdid yourselves this time with the Jan./Feb. issue. It brought back a lot of memories, all of them the best.

We'll be "home" (spell that M-O-N-T-A-N-A) soon for the rest of our days. We need to renew those old memories and to make new ones.

I'd like to get some extra copies to show to a few friends out here who have never been to Montana. We want to show them what they're missing. There's a lot more we *could* show the magazine to, but we don't want to start a stampede!—*Robert V. Pierre; Milwaukee, Wis.*

* * * * *

I just received your Special Photo Issue and love it. I want to frame some of the pictures. I am the leader of a boys club (Royal Rangers) and the name of our tracking patrol is the "Wildcats." The picture on the back cover is just what I've been looking for. I also want to send a copy to Tom Brown, a famous tracker and animal lover on the East Coast.

Thank you for a fine magazine.—*The Rev. Kevin Patterson; Manasquan, N.J.*

For the Advancement Of Conservation

Your tribute to J.N. "Ding" Darling in the Jan./Feb. 1987 issue of *Montana Outdoors* prompts me to send you this bit.

When I was preparing the manuscript for my textbook "Biological Conservation" in 1948, I wrote Ding asking if it would be possible to secure one or two of his cartoons as illustrations.

In reply he sent me a dozen, and wrote, "Feel free to use any or all of them as you see fit. I am happy to contribute in any way I can to the advancement of conservation."

I selected two, which added greatly to the illustrations for the book. It was turned down by several publishers as being of no interest. Then a publisher contacted me in 1953 to see if I still had the manuscript, so it was published in 1954. This tells you a lot about the long period when there was little interest in conservation.

I first taught a course in conservation at Auburn University in 1941 and almost every year thereafter, including three or four terms a year for 25 years at Northeast Missouri State University. Almost every class was closed at 100—the capacity of the biggest room we had in Science Hall. I retired in 1973 and moved to California in 1986.

I receive *MO* as a gift from Mr. and Mrs. Tom Nesbitt of West Yellowstone, so I was greatly interested in the March/April issue as well, both because of the account of Lewis' bird observations and also because I knew Pat Barnes and others in the West Yellowstone area interested in trout fishing. I spent six super summers in West Yellowstone and will always have fond memories of that period.—*John D. Black; Carpinteria, Calif.*

* * * * *

I really enjoyed your Jan./Feb. 1987 issue. Being from Iowa, but having also lived in Montana, I was especially interested in the quotes from "Ding" Darling and his part in the conservation movement.

Could you please send me another copy? I recently took an Iowa history course at college and my instructor is an avid conservationist and fan of Ding Darling. I know he will enjoy this issue very much.—*Mrs. Paul Hay; Otho, Iowa*

ALL BOOKED UP??

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Solitude, Not Solace

I've been trying to tie in the title and the text of the story on the loon (*Montana Outdoors*, March/April 1987, p. 7). The title, "Seeker of Solace," indicates that the bird seeks cheer or comfort in its grief or trouble, but the text states quite firmly that it wants solitude.

Isn't there a paradox there?—*Dr. J. Frederick Bell; Hamilton, Mont.*

• *Your point is well taken. Webster's dictionary defines "solace" as "alleviation of grief or anxiety" or "a source of relief or consolation." "Seeker of Solitude" would have more closely conveyed the correct meaning. But we're seeking solace in our belief that as a title "Seeker of Solace" has a nicer ring to it than "Seeker of Solitude."* —Ed.

Dunbar Praises Smith's Article

I want to compliment Warden Sgt. Randy Smith for his article, "Operation Trophy Kill" (July/August 1986).

He certainly prepared an excellent article to illustrate the enormous problems of investigating, preparing, and taking down a major undercover operation. His participation and firsthand knowledge and presentation of the operation were excellent.

Equally important and well-expressed were Warden Sgt. Smith's thoughtful and needed steps to improve the effectiveness of wildlife law enforcement in Montana. His pertinent and appropriate message came through loud and clear—"Poaching has always been a drain on wildlife populations," and "Large-scale poaching operations can have a devastating effect."

I concur with everything that Warden Sgt. Smith said, except, "Although this was a federal case, it was also in large part a Montana case." I am firmly convinced that the case belonged to the citizens of the state of Montana and that Smith manifested with complete clarity what can be accomplished in a cooperative effort between all facets of law enforcement—state, local, and federal.—*Pete Dunbar, U.S. Attorney; Billings, Mont.*

The One-That-Didn't-Get-Away Club—1986

The list of members in the 1986 "The One-That-Didn't-Get-Away Club" might contain a first: a husband and wife both holding records. Sidney Storm of Havre broke the shovelnose sturgeon record with a 13.72-pound fish caught on the Missouri River. His wife, Kathy, added the longnose sucker to the records lists with a 1.21 pounder taken on the Milk River near Havre.

In all, five fish broke previous records, and three "new" fish were added to the list.

Besides Sidney Storm's shovelnose, the four other records that fell in 1986 were Arctic grayling, blue sucker, carp, and lake whitefish. The lake whitefish was the year's most transitory record. The previous record, 5 pounds, 8 ounces, was established in 1981. That record was broken on May 28 by Lloyd Coleman of Big Fork with a whitefish that weighed 5 pounds, 15-1/2 ounces. An article in Kalispell's Daily Inter Lake reported that Coleman's fish—caught at 11:30 a.m.—was a "feast at a celebration dinner" at 5 that evening. On Aug. 14, Ruby Mutch of Browning broke Coleman's record with a whopper: 10 pounds. Mutch caught her fish on Lower St. Mary Lake.

graphics courtesy *Outdoor Highlights*, Illinois Dept. of Conservation

The record-setting Arctic grayling, weighing 2 pounds, 10-1/2 ounces, was caught at Hyalite Reservoir by Steve Houser of Bozeman. His fish surpassed the old (1974) record by half an ounce. Dudley L. Thiel, Sidney, caught a 7-pound, 4-ounce blue sucker on the Yellowstone River near Sidney that topped the old record of 6.05 pounds (1984). Don Bagley of Dutton beat the previous record (1983) for carp by four ounces; his 38-pound, 8-ounce fish was taken at Eyraud Lakes; it was 40 inches long and 30 inches in girth.

Newcomers to the list besides Kathy Storm's longnose sucker are Utah chub and white bass. The Utah chub caught by M. Steve Kovatch of Bozeman weighed 1.43 pounds and was taken from Canyon Ferry Reservoir. Ludwig Dubbe of Billings caught his 1-pound, 2-ounce white bass below Fort Peck Dam in the dredge cuts of the Missouri River. While white bass are abundant in the Great Lakes region, the catch was quite rare for Montana.

What do you do if you think you've caught a record fish? The Department of Fish, Wildlife and Parks requires that you (1) harvest the fish legally, (2) weigh it on an inspected scale (most grocery store scales are inspected), and (3) have the fish positively identified. *Whenever possible*, that means verification by department personnel. If you can't find a department employee, you must present a photograph from which the fish can be identified; with some species, this is difficult. If you didn't have a department employee weigh the fish, you must present documentation from the store where it was weighed.

As you set off for your fishing adventures this season, remember that records—especially fishing records—are made to be broken. "The One-That-Didn't-Get-Away Club" is always looking for new members.—*Kay Ellerhoff, associate editor*■

Species	Weight lbs.	Weight ozs.	Angler	Year	Location
Arctic grayling*	**2**	**10½**	**Steve Houser**	**1986**	**Hyalite Reservoir**
Bigmouth buffalo	32	6	Gary Lundman	1979	Missouri River (Slippery Ann Game Station)
Black bullhead	1	11	Mike Mitchell	1977	Horse Creek (McCone Co.)
Black crappie	3	2	Al Elser	1973	Tongue River Reservoir
Blue sucker*	**7**	**4**	**Dudley L. Thiel**	**1986**	**Yellowstone River (near Sidney)**
Bluegill	2.64		Brent Fladmo	1983	Peterson's Stock Dam
Brook trout	9	1	John R. Cook	1940	Lower Two Medicine Lake
Brown trout	29	0	E.H. "Peck" Bacon	1966	Wade Lake
Bull trout	25	10	James Hyer	1916	unknown
Burbot (ling)	13	4	Paul Keller, Ernie Schutt	1980	Missouri River (below Fort Peck Dam)
Carp*	**38**	**8**	**Don Bagley**	**1986**	**Eyraud Lakes**
Channel catfish	25.89		Gordon Wentworth	1984	Fort Peck Reservoir
Coho salmon	4	14	Irven Stohl	1973	Fort Peck Reservoir
Cutthroat trout	16	0	William D. Sands	1955	Red Eagle Lake
Freshwater drum	17.55		Dean Johnson	1985	Fort Peck Reservoir
Golden trout	3.14		Terry Cameron	1981	Inlet, Lake At Falls
Goldeye	2	9	Lester Estenson	1977	Nelson Reservoir
King salmon (chinook)	4	7	Barry Gillis	1972	Missouri River
Kokanee (salmon)	5	15	Forrest Johnson	1976	Pishkun Reservoir
Lake trout	42	0	Dave Larson	1979	Flathead Lake (east shore)
Lake whitefish*	**10**	**0**	**Ruby Mutch**	**1986**	**Lower St. Mary Lake**
Largemouth bass	8	2½	Juanita A. Fanning	1984	Milnor Lake
Longnose sucker**	**1.21**		**Kathy L. Storm**	**1986**	**Milk River**
Mountain whitefish	4	9¾	Mike Hangas	1977	Blackfoot River
Northern pike	37	8	Lance Moyler	1972	Tongue River Reservoir
Northern squawfish	7.09		Jim Conlin	1985	Lower Clark Fork River
Paddlefish	142	8	Larry Branstetter	1973	Missouri River
Pallid sturgeon	60	0	Gene Sattler	1979	Yellowstone River
Pumpkinseed	0.95		Tim Colver	1985	Milnor Lake
Pygmy whitefish	0	.16	Orlin Iverson	1982	Ashley Lake
Rainbow trout	20	0	C.J. Brohaugh	1952	Cliff Lake
Rainbow-cutthroat hybrid	30	4	Pat Kelly	1982	Ashley Lake
Sauger	7	2	Raymond V. Johnston	1975	Tongue River Reservoir
Shorthead redhorse sucker	4.68		Ray Quigley	1985	Marias River near Loma
Shortnose gar	3	1	John Johnson	1977	Fort Peck dredge cuts
Shovelnose sturgeon*	**13.72**		**Sidney Storm**	**1986**	**Missouri River**
Smallmouth bass	4	11½	Bob Higson	1975	Horseshoe Lake
Smallmouth buffalo	9	4	Mac McKinney	1977	Hauser Lake (west side)
Stonecat	0.42		Robert M. Garwood	1985	Milk River at Havre
Utah chub**	**1.43**		**M. Steve Kovatch**	**1986**	**Canyon Ferry Reservoir**
Walleye	14	0	Neil Berg	1974	Nelson Reservoir
White bass**	**1**	**2**	**Ludwig Dubbe**	**1986**	**Fort Peck dredge cuts**
White crappie	2	2	Drew Jackson	1978	Tongue River Reservoir
White sturgeon	96	0	Herb Stout	1968	Kootenai River
White sucker	5	5⅓	Fred Perry	1983	Nelson Reservoir
Yellow perch	2	0	Gerald Pottratz	1974	Nelson Reservoir

***New Montana record for 1986**
****New to Montana's record list**

BOOK REVIEWS

CLEARING, by Matthew Hansen, The Kutenai Press, 515 Stephens Ave., Missoula, MT 59801; 1986, $5.95, soft cover.

I'm not a poetry critic, so I won't try to be one here. But the poems in this elegant volume, published by The Kutenai Press, touched me with their passion for life and for the wildlife and landscapes of the West. Some of them, like "Poem for a Beautiful Woman," have a lyrical quality:

> Waxwings are magic birds, I
> watch for them
> in a white aspen grove,
> the sun striking
> smooth bark. The voices come first,
> a ripple
> of sound inside their flight.
> The whole flock
> circles to a tall jackpine,
> green in a
> spiral of illuminated wings.

Others, like "Walking into Silence," are hard-edged and gritty, written by someone who felt the chilling winds of winter as well as the caress of summer breezes:

> The first snow caught me tired
> under the red buttes, worn down
> to a long hollow bone from steady
> miles and White River Pass.
> We each have our own pain, and we
> carry it with us—charred heart
> abandoned at the last camp, lone
> coyote howling on a mudflat
> in the noonday sun. I come to
> sere brown
> meadows that I know, and watch
> gray jays quiet in the great fir.
> I want to escape delusion. I want
> to keep my voice strong, my boots
> greased, and my knife sharp.

For poet Matt Hansen, winter came all too soon. He died of cancer when he was 23.

As Montana author James Welch says in the foreword: "Matt was many things in his twenty-three years: explorer, woodsman, historian, cowhand, conservationist, packer, poet. Whether on a train through Catalonia or on foot in the Bob Marshall Wilderness, he was both traveler and at home. He saw things always as if for the first time and he wrote of the complexity of his seeing. Nothing is easy for a young man learning his way, but in Matt's case, the way was filled with beauty and brilliance and young crusty dignity."

The poems, besides reflecting a close kinship with the plants, animals, mountains, plains, and rivers of the Rocky Mountain West, run the gauntlet of human emotion: love and loneliness, frailty and strength. You'll find yourself rereading them and recognizing that life doesn't have to be lived long to be lived fully.—*Dave Books*

•*Those who donate to the Matthew Hansen Endowment—a fund that offers grants for historical research, creative writing, or wilderness studies that explore the relationship of Montana's people to their land—will receive a copy of "Clearing." While supplies last, a $100 gift entitles the donor to a copy of the limited edition, and a $20 gift entitles the donor to a copy of the trade edition. The endowment is administered by the University of Montana Foundation, and all contributions are tax deductible. Donations should be sent to: Matthew Hansen Endowment, Wilderness Institute, University of Montana; Missoula, MT 59812.*—Ed.

PRAIRIE WILDFLOWERS, by Dr. Dee Strickler, The Flower Press, 192 Larch Lane, Columbia Falls, MT 59912; 1986, 80 pages, $6.95, soft cover.

This handsomely illustrated book, which contains 106 color photographs, bears the subtitle: "Showy Wildflowers of the Plains, Valleys and Foothills in the Northern Rocky Mountain States." As the introduction points out, "The flowers shown in this or any similar guide can only include a sample of the seemingly endless array.... An attempt was made to include at least one species from each family and each major genus of showy wildflowers commonly found in the prairie flora of the Northern Rockies."

The photographs were taken in Montana, Idaho, Wyoming, northern Colorado and Utah, and eastern Washington and Oregon, although the flowers shown range over most of western North America. Each picture is accompanied by a description of the most noticeable features of the species, including the leaves, blooming period, habitat, and range in which the plant grows.

The color photos are excellent, and "Prairie Wildflowers" is a useful beginner's guide to botany and wildflower appreciation.

What's Bugging That Fish?

continued from page 22

unsightly appearance, but they are generally not a threat to humans and, in the case of parasites, many are found in internal organs which the fisherman will discard when he cleans the fish. Those parasites seen through the skin of the fish usually embed in the muscle very close to the surface and can be easily removed before cooking the fish. Whether you see a parasite or suspect a fish is sick, it is always a good idea to cook it thoroughly before eating it.

Many diseases or parasite infections may cause similar symptoms in a fish, so diagnosis based on a telephone description is difficult. But it is important for sportsmen to continue to let us know when they suspect a fish health problem. Often the call is our first alert that a problem exists. Many times, we can quickly explain specific concerns about a fish health problem. But sometimes in-depth microscopic study is required to diagnose diseases.

Of course, the best disease control measure is prevention. Montana's fish health management program is geared toward prevention of disease whenever possible. Prevention includes routine inspection and surveillance of hatcheries and wild populations from which eggs are collected to ensure no disease-infected stocks are used. Another important element of the disease prevention program is the fish disease import law which prohibits importation of fish or fish eggs unless they have been tested and found free of specific disease-causing organisms.

In Montana, we are fortunate to have some of the healthiest fish and highest quality fisheries in the country. This is no accident. The quality of the water and habitat our fish live in is largely responsible for their healthy condition. Habitat and stream protection and enhancement measures taken in Montana are, in effect, fish health measures. A healthy environment means healthy fish and a quality fishing experience for us and for generations to come.■

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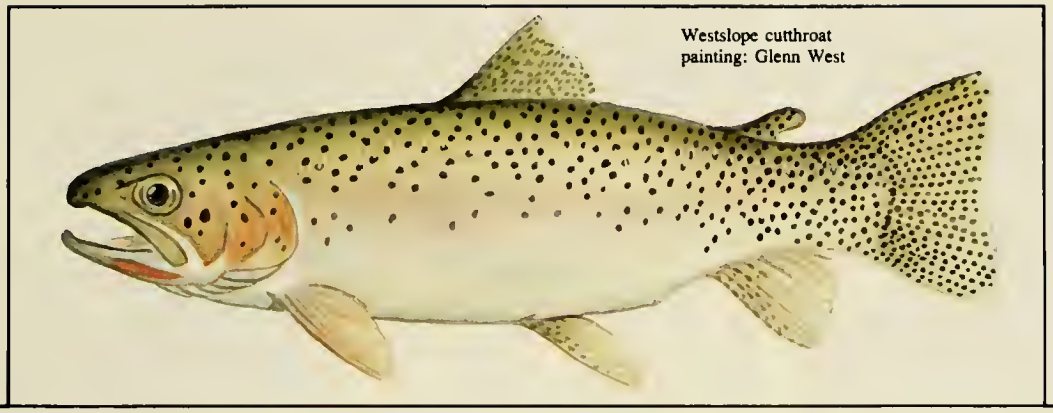
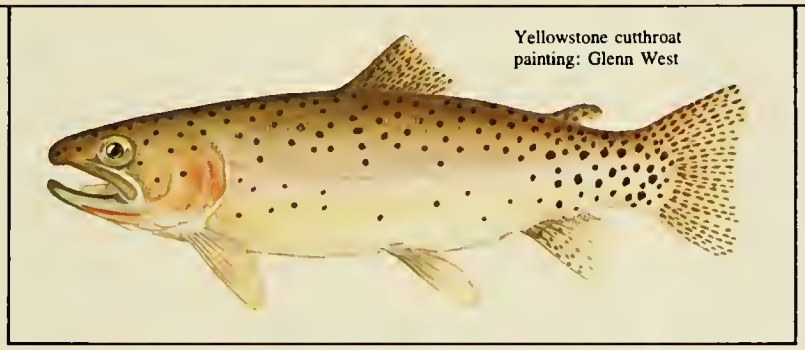
• Here's how to contact the Department of Fish, Wildlife and Parks Fish Health Lab: Giant Springs Trout Hatchery, P.O. Box 2163; Great Falls, MT 59403 (406/452-5734).



Westslope cutthroat
painting: Glenn West

How the Cutthroats Reached Montana

by Jim Roscoe



Yellowstone cutthroat
painting: Glenn West

You have a week's summer vacation and are fortunate enough to live in Montana. You want to go fishing. Should you try for rainbow trout in the Madison or Beaverhead rivers, or maybe fish that secret little stream to get some of those pan-sized "natives"?

But what trout are really native to Montana, and how did they get here? After all, Montana hasn't had any ocean beaches for millions of years, and stocking programs have existed only in the last inkling of geologic time.

Your decision about where to fish may be tempered by the knowledge that the rainbow trout largely found its way to Montana only with the help of man during that last geologic inkling. However, the cutthroat trout found its own way here with the help of the ice age, when the woolly mammoth and other long-gone creatures roamed Montana.

The cutthroat trout, the first black spotted, or true trout, to reach the interior of western North America, appeared before the last ice age, perhaps 70,000 years ago. All 14 subspecies of cutthroat trout (*Salmo clarki*) currently recognized can be traced to a single ancestral cutthroat, most closely related to an Asian trout, *Salmo mykiss*. Before the last glaciation, this ancestral cutthroat had invaded the interior of western North America through the Columbia River system from the Pacific Ocean.

It moved up the Columbia into the headwaters of the Clark Fork and Kootenai rivers, as well as occupying the entire Snake River watershed. Those fish occupying the upper Columbia River drainage eventually gave rise to the subspecies of cutthroat known today as the westslope cutthroat (*Salmo clarki lewisi*), while those in the upper Snake River developed into today's Yellowstone cutthroat (*S. c. bouvieri*). These two subspecies represent the first divergence or splitting of the original cutthroat stock. The westslope cutthroat eventually crossed into the headwaters of the Missouri River in Montana and the South Saskatchewan River in Alberta. Likewise, the Yellowstone cutthroat crossed the Continental Divide to populate the Yellowstone River drainage (Fig. 1). However, this movement took place over thousands of years and was influenced by some drastic geologic events.

Continental glaciation probably had the greatest effect on historical fish distribution in the upper Columbia River Basin. During the last glacial period, the main continental ice sheet was thousands of feet thick across Canada and extended southward into northern Washington, Idaho, and Montana. Glaciation also occurred in most high mountain areas, particularly along the spine of the Continental Divide.

Wherever these glaciers blocked major river drainages, huge lakes were formed; particularly along the main ice front, entire drainage patterns were altered (Fig. 2). This kind of lake formation occurred throughout the area where the original cutthroat was found,

and provided a crucial refuge for all existing fish species. Where these glacial lakes spanned drainage divides, as they did in north central Montana, cutthroat trout moved easily from one drainage to another. Over several thousand years, these lakes were repeatedly formed and then drained, as ice dams failed and were then re-created with the ebb and flow of the ice sheet.

Glacial Lake Missoula probably had the greatest influence on the present distribution of the cutthroat trout indigenous to western Montana, the westslope cutthroat. This glacial lake occupied the Clark Fork, Flathead, and Bitterroot valleys and was formed by an ice dam on the Clark Fork River at the present location of Lake Pend Orielle in Idaho. The lake had a surface area of approximately 2,900 square miles and was first formed about 70,000 years ago. It withdrew for the last time about 7,000 years ago. The lake was sporadic, flooding at least seven times because of repeated failure of the ice dam.

The scouring action of these floods, which lasted for weeks, gouged over 1,000 feet into bedrock to form the basin holding today's Lake Pend Orielle. Downstream in eastern Washington, stream channels were severely eroded, waterfalls were created, and fish populations were destroyed; this flood-caused erosion created the rugged area called the Scablands. Over time, these events barred fish movement into the upper Columbia River Basin and ensured isolation of the westslope cutthroat above Lake Missoula.

While effects of glaciation lingered, the westslope cutthroat dispersed throughout the upper Columbia River Basin. Where there were glacial lakes, movement was easy. It invaded neighboring systems, often by direct stream connections over drainage divides, situations where a lake or stream in a divide flowed to both sides. One direct connection between the drainages of the Columbia and Missouri rivers was present until fairly recently. Summit Lake, on the Continental Divide on Marias Pass near Glacier National Park, drained into both the Flathead and Marias rivers, until the western outlet was dammed by the Great Northern Railway Company in 1891.

Fish probably also were transferred between streams by a process called "headwater stream capture." Cirques are the semicircular basins found in the peaks of many high mountain headwaters. During the last ice age, these formations were at the heads of alpine glaciers. As these glaciers exerted their tremendous erosive power on the mountains, the cirques slowly migrated uphill into the mountains. Occasionally, where all conditions were right, the head of a cirque collapsed, merging the head of the first drainage with that of its neighbor. Any tilting or uplifting of the earth's surface—which was also occurring at this time—enhanced the process. Later, as the glaciers withdrew and disappeared, these altered drainages provided new avenues of dispersal for the westslope cutthroat. In some cases, these avenues even extended across the Continental Divide.

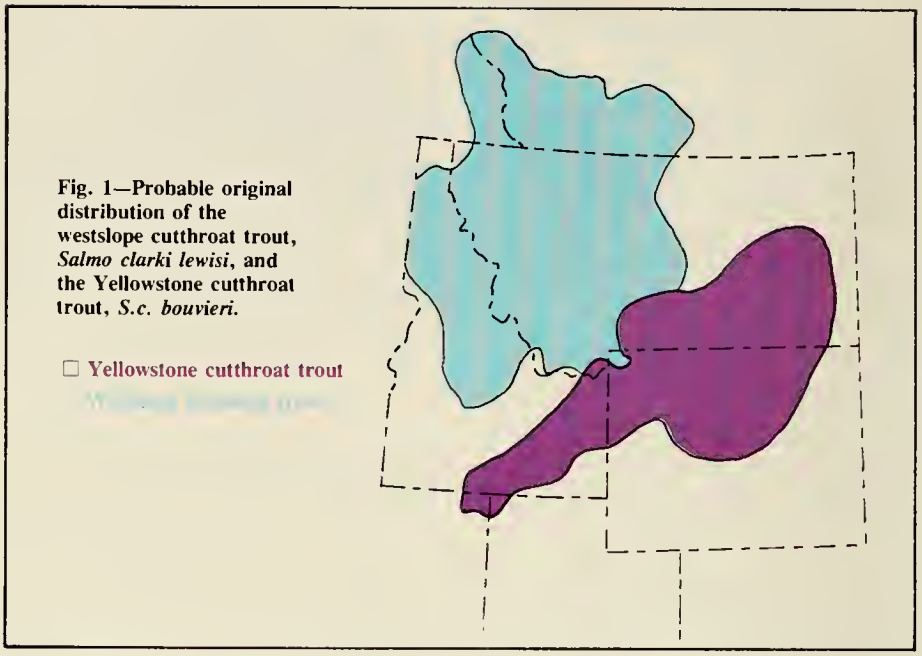


Fig. 1—Probable original distribution of the westslope cutthroat trout, *Salmo clarki lewisi*, and the Yellowstone cutthroat trout, *S.c. bouvieri*.

A likely place for crossovers between drainages is in the vicinity of Glacier National Park. Headwaters of the Columbia, Missouri, and South Saskatchewan River systems all originate within the park, and westslope cutthroat are found in all three systems. As mentioned, one direct connection between systems existed in the area until quite recently. The erosional effects of local glaciation are dramatically obvious in the spectacular sculpturing of the alpine cirques and ridges. With headwaters of streams on both sides of the divide within one mile of each other, the potential for headwater capture and stream transfer is significant.

The historical distribution and physical characteristics of cutthroat trout in Alberta and Montana east of the Continental Divide (excluding the Yellowstone River drainage) indicate that westslope cutthroat from the upper Columbia River Basin entered the upper Missouri and South Saskatchewan River drainages after the end of the last glacial period, from 7,000 to 10,000 years ago. Historically, cutthroat trout were not found in tributaries to Hudson Bay in Canada, other than the South Saskatchewan River, or farther east in this drainage than central Alberta. Likewise, in the Missouri River Basin, cutthroat trout were not found downstream from the Musselshell River.

When the westslope cutthroat reached the east slope of the Continental Divide, its dispersal throughout the upper Missouri system was aided by extensive ice-front lakes similar to Lake Missoula. Early retreat of the main ice sheet formed small glacial lakes in valleys close to the Continental Divide. As the ice retreated farther and meltwater flowed out, these lakes eventually spread out of a single valley or drainage basin and covered fairly large areas. Glacial lakes Cut Bank, St. Mary's, and Cardston are examples. At one time, they spanned the lowland divides now separating the Missouri and South Saskatchewan River basins. Wherever these lakes spread, new habitat for the westslope cutthroat was available and new populations flourished.

The environmental conditions under which the westslope cutthroat survived in western Montana had a direct effect on its survival until the present. As

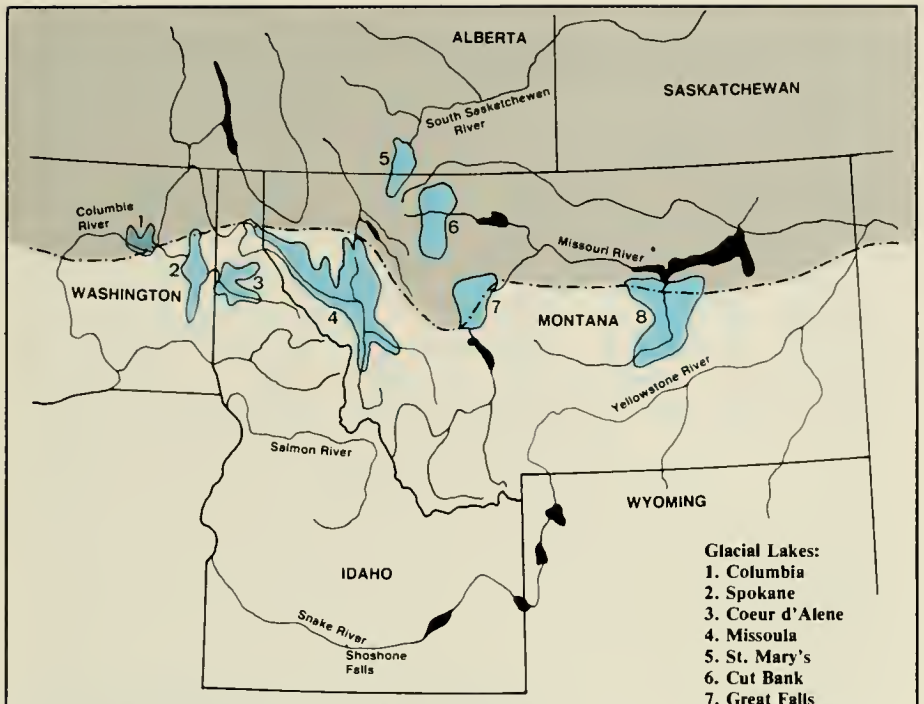


Fig. 2—Maximum southward extent of the continental ice sheet and glacial lakes present along the ice front.

glacial lakes repeatedly flooded and drained, the westslope cutthroat adapted to live in large lakes and large rivers, as well as small headwater streams. This ability to live in a variety of habitats allowed its original widespread distribution into the headwaters of three major river systems.

At the same time the westslope cutthroat was establishing itself in the upper Columbia River Basin, the ancestral cutthroat spread into most tributaries of the Snake River, and eventually crossed the Continental Divide into the headwaters of the Yellowstone River. This fish ultimately became known as the "Yellowstone cutthroat trout." Just how it was distributed in the lower Snake River Basin is unclear today, since many populations have been destroyed naturally, most due to volcanic activity, or have been replaced by the redband trout. The redband is a late comer, not yet taxonomically described, with characteristics in between those of rainbow and cutthroat trouts. Small, relict populations of ancestral cutthroat stock have survived in isolated streams in the lower watershed until recent times.

In contrast to the northern Rocky Mountains where continental glaciation was the primary factor influencing fish distribution, extensive volcanic activity occurred in southern Idaho and northwestern Wyoming. This activity, in conjunction with more localized alpine glaciation, had a profound effect on fish distribution and habitat throughout the Pleistocene Era.

Development of the Snake River Plain over the last several thousand years removed much of the area north of the Snake River as suitable fish habitat. The plain is comprised of overlapping lava flows, some only 2,000 years old, extending from the foot of the mountains on the north to the Snake River on the south. Because lava is porous, any water flowing out of the adjoining mountains is "absorbed," completely eliminating downstream water courses. As a result, streams originally tributary to the Snake River, such as Big Lost River, Little Lost River, and Birch Creek, and the cutthroat populations inhabiting them, are now completely isolated.

During this same time, a huge inland lake called Lake Bonneville was forming in the Great Basin of Utah as a result of melting alpine glaciers. This lake continued to grow until approximately 30,000 years ago when it finally overflowed through Red Rock Pass south of Pocatello, Idaho, and into the Snake River. As flows increased through the narrow pass, an overwhelming flood rushed into the Snake River. The flood continued for weeks and carried house-sized boulders as far as 100 miles downstream. The erosive force of such a flood was tremendous and resulted in significant channel damage all the way to the Columbia River. Most important, this flood created the 212-foot Shoshone Falls near Twin Falls, Idaho, blocking fish movement into the upper watershed and isolating the cutthroat trout already there.

Farther up the Snake River, much more violent volcanic activity was shaping the Yellowstone Plateau. Whatever fish managed to move upstream into the headwaters were periodically destroyed by repeated volcanic eruptions and lava flows. In addition, the ebb and flow of alpine glaciers continued to sculpt the landscape, at times even overlying active lava flows.

Life for the ancestral cutthroat trout has been tenuous in the Snake River. But during the thousands of years this geologic activity has been going on, suitable habitat was always available and the fish survived, sometimes by inhabiting small headwater streams spared from volcanic destruction or glaciation, or by retreating to the refuge of the mainstem Snake River.

The last major geologic event in the upper Snake River-Yellowstone area was the Pinedale Glaciation which coincided with the last major advance of the continental ice sheets approximately 75,000 years ago. Alpine glaciers, often up to 3,000 feet thick, covered the entire Yellowstone Plateau periodically during this time. With the final melting of these glaciers about 8,000 years ago, the area was once again open to occupation, and development of present-day plant and animal communities began.

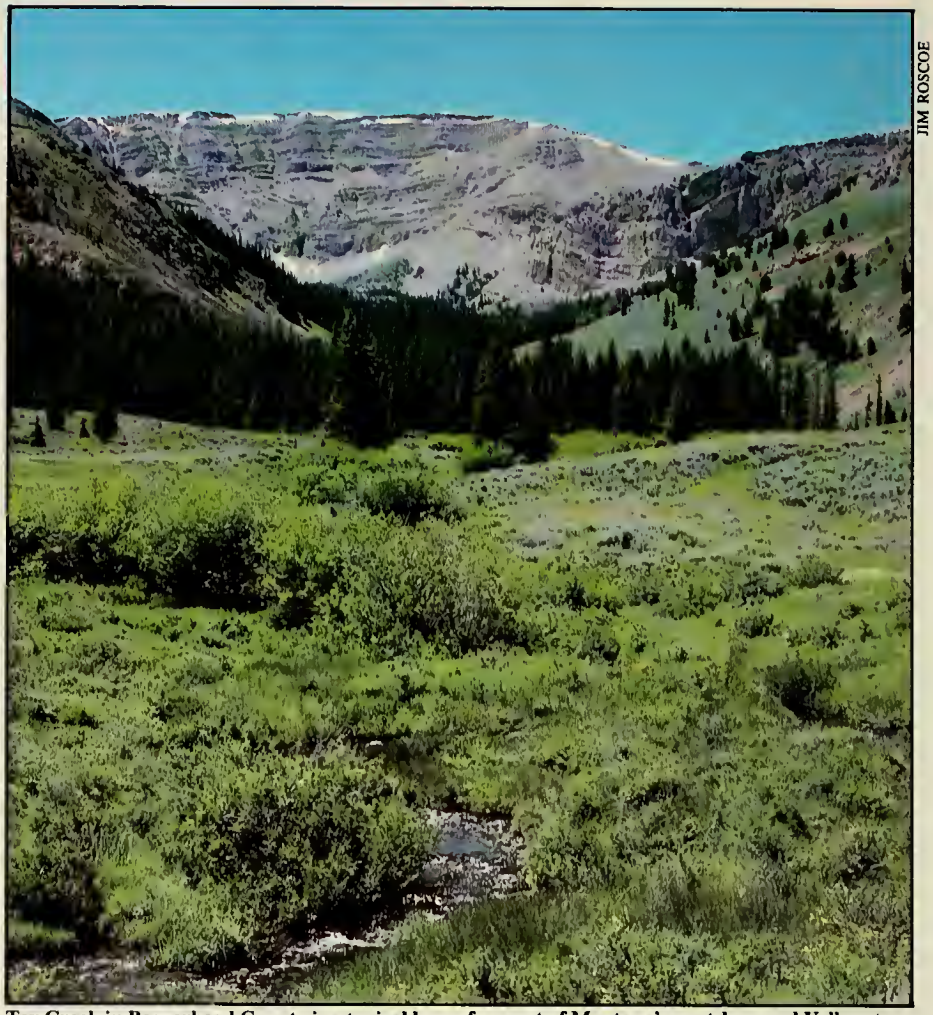
Cutthroat trout which had survived in the Snake River Basin and were now isolated above Shoshone Falls gradually spread once again into the headwaters. The headwaters of the Yellowstone River across the Continental Divide were devoid of all fish life, and recolonization had to occur from across the divide. In the absence of large glacial lakes such as those which aided westslope cutthroat movement in northern Montana, fish could move across drainage divides only through direct connections or headwater capture. Stream transfers between headwaters probably occurred between adjacent tributary drainages in this area, but there is little evidence that a major headwater capture and transfer occurred across the Conti-

nental Divide. However, early explorers of the area around Yellowstone National Park found a *continuous* water route that straddles the divide in Two Ocean Pass, in the southeastern corner of the park. This probably served as a route by which cutthroat trout occupied the Yellowstone River system.

Two Ocean Pass is a broad saddle which holds the headwaters of Pacific Creek (Two Ocean Creek), tributary to the Snake River, and Atlantic Creek, flowing into Yellowstone Lake and the Missouri River. Because of the unique topography of the pass, water flowing into the saddle from the north in North Two Ocean Creek actually divides into two channels and flows both ways off the Continental Divide. This area was first recognized in 1893 by Barton Everman and David Starr Jordan as the most likely route for fish to move across the divide. Unfortunately, they thought that cutthroat trout in the Yellowstone drainage had progressed upstream from the Missouri River and then crossed into the headwaters of the Snake River—exactly the reverse of what actually had happened.

At this point, the westslope cutthroat and the Yellowstone cutthroat, which had been physically separated for thousands of years and had become genetically different subspecies, were about to be reunited through man's oversight. During their expeditions in the early 1890s, Everman and Jordan also found the westslope cutthroat in the upper Missouri drainage. By failing to recognize the physical differences between the two subspecies, Everman and Jordan assumed they were the same fish. They logically surmised then that the fish in the Yellowstone system and the upper Missouri must have had a common origin in the Missouri River.

This idea has caused confusion for both taxonomists and biologists for over 80 years, since no one acknowledged that the westslope and Yellowstone cutthroat were genetically different fish and that their original ranges did not overlap. By the early 1900s, the Yellowstone cutthroat was found to be a quality sport fish suitable for stocking programs, with a relatively accessible brood stock available in Yellowstone Lake. Consequently, during intensive and indiscriminate stocking by state and federal agencies, the Yellowstone cutthroat was introduced into waters far outside its native range, often displacing or replacing whatever native fish were present. Hybridization readily occurred where Yellowstone cutthroat were introduced into westslope cutthroat streams, and often the westslope was simply overwhelmed by the sheer numbers of Yellowstone cutthroat released. Since, habitat losses and population declines in many areas have further obscured the original distribution of both Yellowstone and westslope cutthroats.



JIM ROSCOE

Tex Creek in Beaverhead County is a typical home for most of Montana's westslope and Yellowstone cutthroat trout. When left undisturbed, such streams have been vital refuges for cutthroat survival.

Fortunately, within the past 15 years, researchers, such as Dr. Robert Behnke at Colorado State University and Dr. Fred Allendorf at the University of Montana, have traced the geographic and genetic backgrounds of both the westslope and Yellowstone cutthroat trout, and have provided much-needed physical descriptions of both subspecies. This has allowed biologists to determine existing distributions of both fish and to identify relatively pure populations.

Both cutthroat subspecies are now integral parts of fishery management programs in western Montana. Because of the scarcity of pure populations, both cutthroats are designated a priority species of special concern by the Montana Department of Fish, Wildlife and Parks and are the focus of population and habitat rehabilitation projects in several areas. In addition, the Yellowstone cutthroat supports a nationally known fishery in the Yellowstone River and is the mainstay of the alpine lake stocking program in southwestern Montana.

Together, the westslope and Yellowstone cutthroat trout are Montana's state fish and are a treasured part of Montana's natural heritage. With continued management emphasis and public recognition, these prized "natives" can assuredly be maintained as a valuable fishery resource, and serve as a reminder of the days when the forces of nature were busily sculpting the face of Montana. ■

CONTRIBUTORS

• "Anglers worship them, outdoor writers exalt them, and scientists treasure them." What are they? "Spring Creeks—Precious Secrets." As **Janet-Decker Hess** writes, in spite of their uniqueness and popularity with the angling public, no major survey of Montana's spring creeks previously had been conducted. "In a state so blessed with abundant populations of fish and wildlife, it is sometimes easy to forget small streams flowing through hayfields," she continues. Fisheries biologists began an inventory in 1985 to gather up-to-date information on this fragile resource, and some of the results are sobering. Decker-Hess, based in Kalispell, is project manager for the Northwest Rivers Study. She wishes to especially thank Carl Sullivan, executive director of the American Fisheries Society, for bringing attention to a resource too precious to lose: spring creeks. Her article begins on page 2.

One of Montana's finest "fishing" artists did the illustration for the spring creeks piece. Helenan **Shirley Cleary's** work has appeared often in our pages. Starting this summer, she will be accepting commissions to do paintings of people fishing on Montana streams. She has been added to the prestigious "Who's Who in American Art" listing for 1987. In 1986, she participated in a Women in Wildlife Show, an invitational exhibit sponsored by Wild Wings Gallery in Minnesota; she was also featured in *The Artists* magazine.

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• It's quite a trick. If you're an angler who wants to catch trout on dry salmonfly imitations, you'll have to be on the part of the river where trout are dining on the surface. It will require racing from boat put-in to saloon to take-out, asking questions like, "Are They at Melrose Yet?" Nobody knows what triggers the move of these big aquatic hamburgers to the beach, but there's one thing **Jim Belsey** *does* know: There's nothing a trout loves more than biting into a large, succulent stonefly. As he writes, "Happily for the trout, on many Montana rivers the opportunity to do so is an annual banquet, commonly called the salmonfly hatch." Belsey is a sales promotion consultant for Inter-Fluve, Inc., a Bozeman stream rehabilitation firm. He also guides fishermen on the Smith River for Big Sky Expeditions. A former executive director for Colorado Trout Unlimited, Belsey first fished the Montana salmonfly hatch in 1986. Belsey's article—another installment in our "Perspectives" series—begins on page 6.

Harvey Eckert is well-known for his accurate, colorful, and true-to-life fishing art. His illustration for the salmonfly article is no exception. He is a full-time freelancer, and his work has appeared in many fishing publications. For additional information about his work, contact him at 4041 Paxson; Butte, MT 59701 (406/494-6021).

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• Black bears are distributed over about 34,000 square miles in Montana. Almost half of this area is also occupied by grizzly bears. Because grizzly bear hunting is much more closely restricted than black bear hunting, **Wayne Kasworm** emphasizes, "It is imperative that hunters positively identify their target before shooting." His "quiz," which includes 18 photos for you to identify as "Black or Grizzly?" will help improve your identification skills. Turn to page 8 for his article. Kasworm, headquartered in Libby, is a Department of Fish, Wildlife and Parks wildlife biologist working on a grizzly bear study in the Cabinet Mountains.

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• DU deserves a lot of credit for "Launching Waterfowl's Lifeboat." After the calamitous drought of the 1930s, waterfowl needed a lifeboat and Ducks Unlimited was formed to fill that need. In 1987—DU's golden anniversary—there are 600,000 members worldwide and they have contributed almost $400 million toward developing waterfowl habitat in North America. In 1984, DU embarked on its U.S. Habitat Program and began to fund wetland projects in Alaska, the Dakotas, Minnesota, and Montana. In the past three years in Montana, DU has spent $2 million and 25 projects have either been developed or are on-line for future development. Turn to page 15 for **Tom Palmer's** timely article. Palmer is a writer with the department's Conservation Education Division in Helena. He also wrote the profiles of Spence Hegstad and F.W. "Bill" Howell, leading off this issue's "The Catchall" section.

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• "I caught a fish last week and it was skinny and had white, fuzzy patches all over its head and back. What was wrong with it?" "I caught about a dozen fish and all of them had little black spots on their sides and fins. Could I have eaten them?" These are typical questions received at the department's Fish Health Lab, and **Jim Peterson** will try to tell you "What's Bugging That Fish?" As he emphasizes, such calls from concerned fishermen are often the first clue that something is wrong. Peterson is a fish health biologist, headquartered at the Fish Health Lab at Giant Springs Trout Hatchery in Great Falls. Turn to his article on page 21.

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• What trout are really native to Montana, and how did they get here? Before trying to answer, consider this: Montana hasn't had any ocean beaches for millions of years, and stocking programs have existed only in the last wink of geologic time. **Jim Roscoe** tells a fascinating story: The "cutthroat trout found its own way here with the help of the ice age, when the woolly mammoth and other long-gone creatures roamed Montana." Roscoe is a wildlife biologist with the Bureau of Land Management in Dillon. Turn to "How the Cutthroats Reached Montana" on page 27.

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• If you had to describe sailboarding in four words, "Dancing Across the Waves" would come pretty close. The sailboard was invented as a means of combining elements of surfing and sailing, and the resulting sport has been called "the sport of the 80s." As **Bill Stroud** and **Jerry Walker** note, Montana has many bodies of water perfect for this activity. Turn to their article on page 32. Stroud is the co-owner of Surf & Sail in Billings; Walker is the Lake Elmo Park manager for the department's Parks Division.

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• "A Fish Called Cisco" has already done a lot for Fort Peck Reservoir. In the late 1970s and early '80s, fisheries biologists noted a decline in the overall forage base in the reservoir. As the forage base declined, so did condition of game fish dependent on these forage fish for food. Enter the cisco, also called "lake herring" or "tullibee." As **Bill Wiedenheft** notes, this new food source is showing a great deal of promise, as well as adding to the reservoir's diversity as a fishery. He has been project biologist at Fort Peck since 1982. Turn to his article on page 34.

* * * * *

• *MO* wishes to thank the following photographers for their contributions to this issue: **Mark Calamar**, Corps of Engineers; **Mike Logan**, Helena; **Bruce Roberts**, Bozeman, and the following photographers who work for the department: **Ray Berntsen**, Billings, and **Louis M. Kis**, Kalispell.

Dancing Across the Waves

by Bill Stroud
and
Jerry Walker

On a blustery spring afternoon on a small lake near Billings, brightly colored sails dance across the water. The gusty 25-mile-per-hour breeze propels the sails, the attached boards, and the riders across Lake Elmo. It's a performance that captivates dozens of spectators who stop their vehicles along the adjacent drive and get out to watch. What is this activity that causes almost every driver at least to slow down to catch a better glimpse?

No matter what you call this newest of water sports—boardsailing, windsurfing, or sailboarding—people of all ages, all over the world, are participating. It's been called "a sport for all ages," "the sport of the '80s," "the purest form of sailing," and "the fastest growing sport in the world," It is the latest addition to the Olympic Games,

photo: JERRY WALKER

and the ultimate free ride. From beginner to champion, the sport offers participants excitement, enjoyment, and challenge.

The sailboard was invented in southern California in 1966 by Hoyle Schweitzer, a surfing expert, and Jim Drake, an expert at sailing, as a means of combining elements of their two sports. A sailboard resembles a surfboard, only with a sail and daggerboard attached. (A "daggerboard" is a plank of wood or plastic inserted into the hull of a boat or sailboard which projects down into the water to reduce sideways slippage; it slides vertically into its "well" or "trunk," like a dagger into a sheath.) The popularity of sailboarding in Montana seems to have begun in earnest in the early 1980s.

Learning how to boardsail can be fun, and when you use the proper equipment and sailing techniques, it is also relatively easy. It allows those who have never sailed before to experience the exhilaration of moving over the water powered only by the wind.

The sport itself is extremely safe; most bigger boards, such as those used by beginners, will support up to 400 pounds. This makes them quite safe from the standpoint of buoyancy and balance. A "free sail" system is attached to the board with a universal joint, so the instant the sailor falls and lets go, the sail falls in the water and acts as an anchor. If a sailor falls off, he or she would have to swim only a few feet to recover the board and to climb back onto it.

The sailboard is light, easily transported, and it doesn't require licenses, docking fees, and expensive trailers. In Montana, boardsailers are required to have aboard a Coast Guard-approved personal flotation device (PFD); sailors under 12 *must* wear the PFD, but most other sailors also choose to do so because it's awkward to attach the PFD to the sailboard.

Where wind and water meet, boardsailors are learning new skills, making new friends, and accepting the challenge of trying this exciting outdoor activity. Boardsailors are gliding across inland lakes, rivers, and ponds. They are racing around buoys on established courses. They are doing "hot-dogging" tricks off beaches and surfing down ocean swells.

The rise in the popularity of sailboarding in Montana coincided with the Coal Tax Fund acquisition of Lake Elmo (named after a previous owner, Elmo McCracken) in 1983. This state recreation area on the outskirts of Billings became the mecca for the first concentrated gathering of aspiring boardsailors in Montana. The 64-acre lake is perfect for this activity because it has fairly consistent winds; unlike larger bodies of water, the size prevents sailors (especially beginners) from being blown miles from shore.

In addition, the lake and surrounding

JERRY WALKER

shore are publicly owned, adjacent to Montana's largest city, and, since the time the site was acquired by the Montana Department of Fish, Wildlife and Parks (DFWP), closed to motorized boat use. These conditions make Lake Elmo a natural for boardsailing.

The increasing number of boardsailors using Lake Elmo led to the formation in 1984 of the largest sailboard club in Montana, the Windriders. The club was organized to promote the sport, to increase awareness of safety and right-of-way rules, and to conduct workshops and racing clinics. Of course, another goal of club members is to have fun. The club has succeeded on every count; in addition, members have worked on many projects to clean up and beautify Lake Elmo and the adjacent park, to the benefit of all boardsailors as well as other recreationists.

Since the early '80s, boardsailing has attracted participants from one end of Montana to the other, and they have tried most sailable bodies of water. Waters on which sailboards are commonly plied include Canyon Ferry Reservoir, Flathead Lake, Fort Peck Reservoir, Deadman's Basin Reservoir, Hebgen Lake, and Dailey Lake near Bozeman. Many of these lakes and reservoirs are considered appropriate only for more experienced boardsailors because winds occasionally can be very strong.

With complete gear available for under $600, boardsailing offers a relatively inexpensive sailing experience, with most costs related to initial purchase. There's no need to spend the additional funds associated with "big boat" sailing.

Through trial and error, you can learn to boardsail on your own. In the days before good schools, instructional manuals, and books, aspiring boardsailors did just that. However, if you rent or borrow equipment and try to teach yourself, you could also be in for a lot of frustration. You may end up cheating yourself of a fun experience in which you learn all the "right" techniques. Attempts made on your own, without a trained instructor, proper equipment, and ideal conditions, can become very trying and cause you to abandon the sport.

Find a qualified boardsailing school and you will easily learn to experience the full enjoyment and exhilaration of the sport. At a nationally certified school, about 90% of beginning students learn basics of balance, sailing technique, tacking, and jibbing in less than six hours (mastery of these techniques takes about 30 hours). Lessons help prevent bad habits. By signing up for instruction, you can experience the ultimate of being in harmony with wind and water.

While most boardsailors are simply recreational sailors, there is a wide range of competitive activities an individual may choose to pursue. Whatever your level of participation, benefits of boardsailing include the simple pleasure of skimming across the open water, escaping the day's cares, refreshing body and mind, conditioning the body, and enhancing coordination.

Are you still skeptical? The key that turns skeptic into addict is the discovery that a lake, reservoir, or pond lies within a few miles of where you are right now—and that a sailboard could provide hours of enjoyment on that body of water. All you need to do is relax, unwind, and practice. Within days, the sailboard will become an extension of your body as you dance across the waves. ■

A FISH CALLED CISCO

by Bill Wiedenheft

It had been another unbearably hot August day in eastern Montana. One of those parched, windless, summer days when my wife and I loaded up the kids and headed out to Fort Peck Reservoir for a refreshing and therapeutic afternoon of boating and water skiing.

We had made our usual sweep across the face of the dam and throttled down the outboard near the mouth of Duck Creek Bay to change skiers. As my 11-year-old son pulled himself aboard, something on the water's placid surface caught my attention. Several hundred feet from the boat, the water suddenly started churning in an area about 30 feet in diameter. I called to my wife to take a look at the odd rippling, but as I pointed, the commotion ceased. Naturally, my wife thought I'd been out in the blistering sun too long, and muttered something about hallucinating. In spite of her doubts, our eyes began to search the mirrorlike surface of the reservoir for similar disturbances. Before too long, my son Blake shouted that he saw the water "boiling" on the other side of the boat.

As we looked in bewilderment, we spotted other isolated

The powerhouse at Fort Peck Dam lights up the skyline (photo: Mark Calamar, Corps of Engineers).

areas of rippling water in all directions. A spot from 10 to 30 feet in diameter would erupt in a flurry of activity, and then as suddenly as it began, it would subside. The spectacle appeared to be caused by schools of small, silvery fish churning the water's surface. Once I saw the fish, I realized that we were witnessing the same phenomenon that other boaters and fishermen had reported while plying the calm waters of the reservoir. They had mentioned large schools of "little minnows dancing" on the lake's surface.

As we continued to watch these little critters, I thought how remarkable it was that Fort Peck finally had a forage fish of such abundance. These fish were probably young-of-year cisco either surface feeding or being chased to the surface by hungry predatory fish.

Just a few weeks before the unusual incident, the Fort Peck fisheries crew set small-mesh vertical gill nets near the dam and recovered hundreds of four- to five-inch cisco. In late June, a sonar depth recorder revealed many "clouds" of small fish. What my family and I had seen on that hot August day and what other boaters had observed was the long awaited arrival of a new forage fish in Fort Peck.

Why Cisco?

In the late 1970s and early '80s, fisheries biologists documented a decline in the overall forage base in Fort Peck Reservoir, along with the degenerating condition of game fish. They attributed the problem to the natural aging process that all reservoirs undergo, along with unstable water levels which reduced the reservoir's overall productivity. This problem was not peculiar to Fort Peck. Forage fish had also declined on reservoirs on the Missouri's mainstem in North and South Dakota. These declines prompted fish and game agencies to introduce new forage species more suited to the existing reservoir conditions. Sportsmen's groups in eastern Montana

were naturally upset with the deteriorating Fort Peck fishery, and they asked the Montana Department of Fish, Wildlife and Parks (DFWP) to stock rainbow smelt, which were apparently having a tremendous positive impact on the sport fishery in other Missouri mainstem reservoirs.

After an extensive literature review, the writing of an environmental impact statement by Wayne Hadley (under contract with DFWP), and consultation with personnel from other state and federal fish and wildlife agencies, DFWP fisheries biologists concluded that rainbow smelt was not the species to introduce into Fort Peck. They concluded the rainbow smelt's extremely mobile nature, its capacity for competition with other fish which share its food, and its reputation for eating the eggs, larvae, and young of other fish, could threaten fish populations in Fort Peck. They also considered rainbow smelt a potential threat to trout populations in the Missouri River drainage above the reservoir.

After screening many forage fish candidates, researchers concluded the cisco (also called "lake herring" or "tullibee") offered the greatest benefit to the existing fishery, with the least risk. Cisco (*Coregonus artedii*) is a member of the family Salmonidae, and is similar to other whitefish species in Montana. The cisco was considered a good complement to the spottail shiner, which had been introduced in 1982. The spottail inhabits the shallow, shoreline areas of the reservoir, while the cisco prefers deep, open water. Cisco also demonstrated great versatility in spawning habitat requirements—they will spawn in shallow or deep water, and over almost any type of firm bottom.

Once DFWP biologists had decided to introduce cisco into Fort Peck, we needed to address several problems. First, we had to locate a reliable source of cisco eggs, and second, we had to find a suitable hatching facility.

Cisco eggs require a long incubation to develop properly, and this meant finding a hatchery with an average water temperature near 35°F from mid-November to early April. Surprisingly, the best location for hatching these eggs was not a hatchery at all, but the penstock area (the area between the main tunnel and turbines, where the water flows from main tunnels to branch tunnels) in the powerhouse at Fort Peck Dam. This site had sufficient room and an adequate supply of good-quality water at the proper temperature. The U.S. Army Corps of Engineers agreed to allow construction and operation of a temporary egg-hatching facility at one of the Fort Peck powerhouses.

In early 1983, the department sent letters of inquiry to numerous states and provinces concerning availability of cisco eggs. (Eggs were requested to avoid transfer of parasites and diseases common to adult cisco.) By fall, the Minnesota Department of Natural Resources offered to supply Montana with 3 million cisco eggs from its cisco egg-taking program. Under this program, tens of millions of fry were stocked into Lake Superior to improve commercial fishing for cisco. We obtained the eggs in November and transported them to the powerhouse at Fort Peck and then to the hatchery at Miles City.

Although the Miles City hatchery did not offer the ideal environment for incubating cisco eggs, it worked as a suitable backup for the untested Fort Peck facility. In the meantime, the Saskatchewan Department of Tourism and Renewable Resources had also offered to supply Montana with cisco eggs. In addition, the Canadian agency was willing to incubate the

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In May of 1985—one year after cisco fry were released into Fort Peck Reservoir—eight-inch fish (above) were recovered from gill nets near the face of Fort Peck Dam. By November, the 1-1/2-year old cisco (below) averaged nearly 13 inches in length and appeared to be fully mature.

eggs until the "eyed" stage (the eye of the fish embryo is visible) at its Fish Culture Station at Fort Qu'Appelle.

In mid-November 1983, fishery workers took over 11 million eggs from a naturally spawning cisco population in Echo and Pasqua lakes on the Qu'Appelle River. The eggs eyed in early January 1984, and were transported to the temporary hatchery at Fort Peck in late February to continue their incubation until hatching. The cisco fry began to hatch in mid-April; after several weeks, biologists introduced about 8 million fry into the reservoir. Over 150 days had passed from the time the eggs were spawned until they first began hatching.

After we released these tiny creatures, we didn't see them again for eight months—a fisheries crew doing routine beach seining in the Fort Peck cabin area near the dam captured one four-inch cisco. Cisco then eluded us until January 1985 when we found several seven-inch fish in the eddies below the powerhouse. We guessed these fish had been flushed from the reservoir through the dam's turbines.

To assure rapid establishment of cisco in Fort Peck, the department secured additional cisco eggs from Saskatchewan in November 1984. In April 1985, after hatching at the Fort Peck powerhouse, we released approximately 10 million fry into the reservoir. In May 1985—one year after we had released the first cisco fry into the reservoir—we caught eight- to nine-inch cisco in gill nets near the face of the dam. By August of that year, they averaged nearly 12 inches and showed signs of sexual maturity. In November 1985, these cisco, only 1 1/2 years old, appeared to be fully sexually matured; females were running eggs, and males were running milt. These adult cisco averaged nearly 13 inches. This newly

introduced fish had already surpassed our greatest expectations and continued to increase in both numbers and size. Throughout their natural range, cisco do not normally reach this size or stage of maturity until 3 or 4 years of age.

The final taking of cisco eggs in Saskatchewan occurred in November 1985, and we released over 14 million fry into Fort Peck Reservoir in April 1986. During that summer, anglers began reporting "clouds" and "moving islands" of fish on their depth recorders. To verify these reports, we set vertical gill nets of 1/2-inch mesh at various locations throughout the lake in early August. We determined these huge schools of fish were young-of-year cisco. We sampled literally thousands of four- to five-inch fish. Such large numbers of young cisco indicated that both the 1986 spring stocking of fry and natural reproduction by adult fish the previous fall had apparently succeeded.

Test netting of adult cisco in the reservoir in fall of 1986 indicated that cisco may have been even more successful in their fall spawning run of 1985. The average number of eggs produced by a two-pound female in other lakes where cisco populations are established is 20,000; in September 1986, we examined several two-pound cisco in Fort Peck with over 40,000 eggs.

Cisco Needs

Cisco prefer cool water. In warm weather, they descend to great depths in search of water more suited to their preferences. In fall, as water temperatures decline, adult cisco move into shallow water to spawn. Males move toward shore when water temperatures reach the low 40s, and females follow shortly after. Cisco differ from other species of salmonids because they neither prepare nor take care of their spawning bed. Eggs are broadcast over almost any type of bottom, usually in shoal areas. One or two males usually follow each spawning female, emitting clouds of milt to fertilize eggs. Once adult cisco spawn, they return to open water for the winter.

The eggs incubate slowly in the frigid water, and usually hatch about the time ice goes out in the spring. Shortly after hatching, the fry leave the shallows and head for deeper water.

Throughout their lives, cisco feed predominantly on zooplankton. They strain the zooplankton from the water with very fine gill rakers. Cisco occasionally feed on aquatic insect larvae and terrestrial insects that fall on the surface of the water. Large cisco sometimes feed on small minnows. Large schools of adult cisco feed from the water surface as insects emerge in spring. At this time, cisco can be caught by fly casting with either wet or dry flies or small streamers. In the fall, anglers can take cisco with small spinners. During winter, fishermen use grubs or small minnows to catch cisco through the ice.

Cisco are a popular sport fish in northern Minnesota lakes during winter and spring. Large numbers are commercially fished in late fall in the Great Lakes area and in the Canadian provinces. Many people have told me the flesh of cisco is "excellent" and "easily filleted"; I have tried Fort Peck cisco smoked and found it very tasty.

Benefits to Game Fish

Before spring 1986, the cisco population in Fort Peck was entirely stocked fish. They weren't abundant enough to discernibly affect the growth of most game fish. Spring trapping and late summer gill netting showed no marked increases in average or maximum sizes of walleye, sauger, or northern pike.

The first cisco year-class produced by natural reproduction was in spring of 1986. In spite of the huge number of young cisco observed this past summer, most game fish apparently didn't fully utilize this new food resource. We believe these cisco remained in deep, open water, where they were unavailable as forage through most of the spring and summer. Cisco studies show that young fry move to deep water shortly after hatching and don't return to shallow water until the following spring for feeding.

If this theory is correct, then game fish which prefer the shallow water should "tap into" the cisco food source during the '86 fall spawning run and this spring when cisco return to shoal areas to feed on insects. We know that walleye and northerns are already using this new food resource, because anglers last fall and winter reported "lots of fat" on these predatory species.

MARK CALAMAR (COE)

Cisco eggs need a long incubation period to develop properly. The powerhouse at Fort Peck Dam provided an ideal environment, due to availability of an adequate supply of good-quality water at the right temperature.

A survey of lake trout fishermen in September and October 1986 indicated the average size of lakers had increased by 1/2-pound over those fish surveyed a year earlier. This seems logical, as lake trout usually occupy the same habitat as cisco during most of the year. In other lakes and reservoirs where both species are present, lakers are known to feed almost exclusively on cisco.

As the cisco population continues to expand, it will not only help to improve the growth of established game fish species in the reservoir, but will also provide a more diversified fishery. We have done very limited stocking of chinook salmon in the reservoir since 1983. If numbers of cisco continue to increase, the chinook should do well.

The outlook for the reservoir is promising. Annual spring and summer surveys by department fisheries personnel, as well as reports from fishermen, should tell the whole story. In the meantime, it's tough for anglers and fisheries biologists not to be optimistic about the future fishery in Fort Peck Reservoir!■